THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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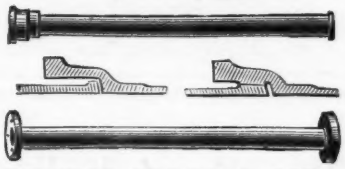

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Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

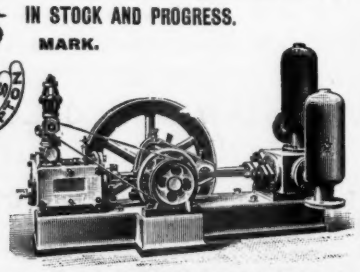

Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

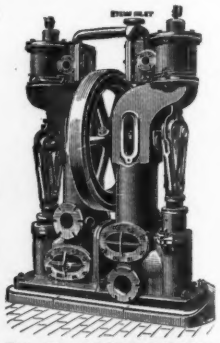

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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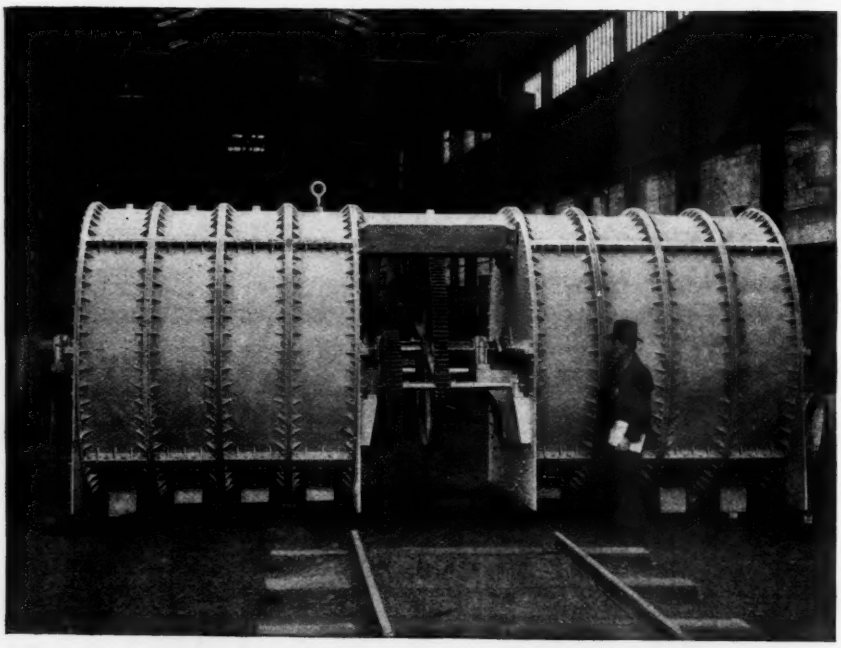

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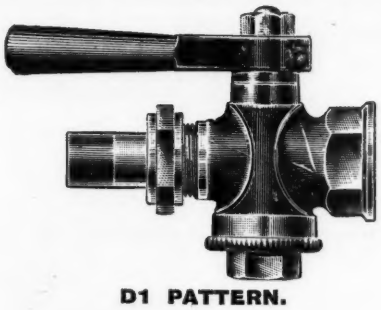

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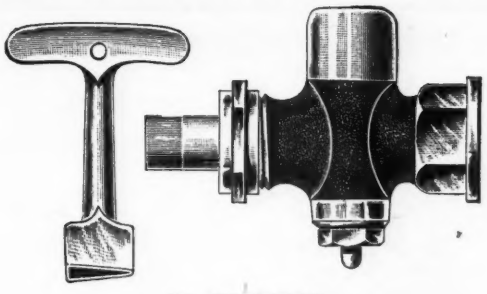

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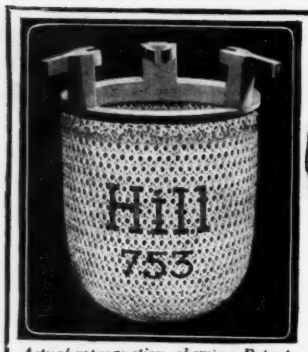

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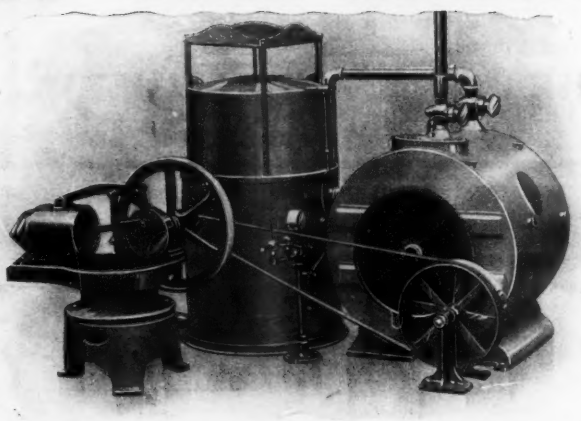

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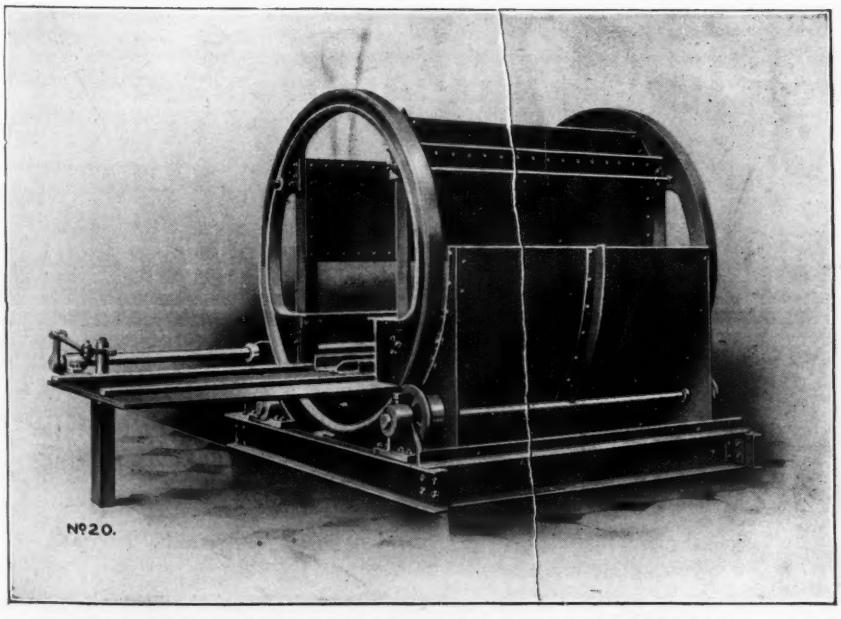

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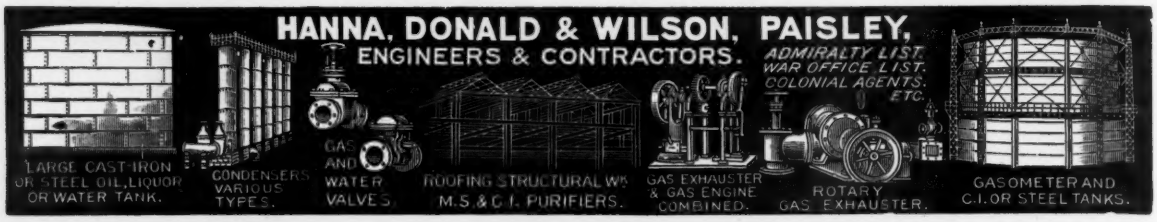
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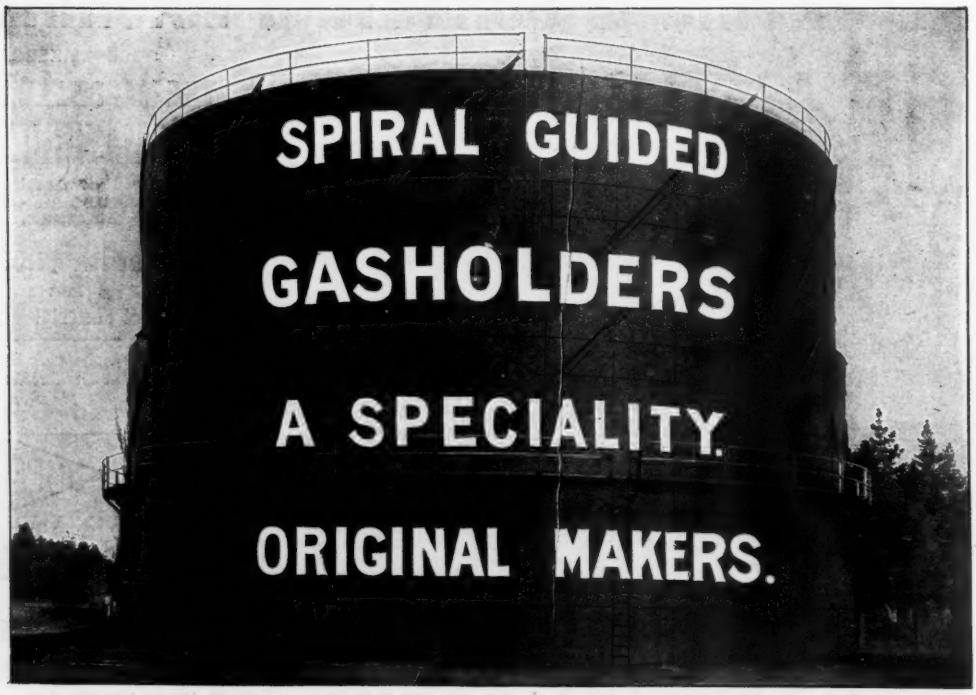

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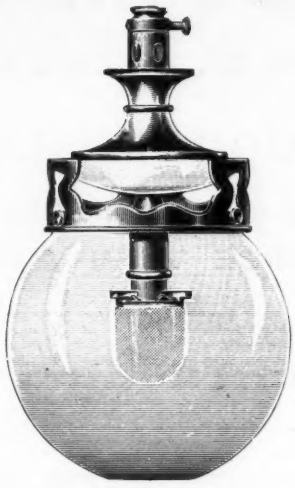

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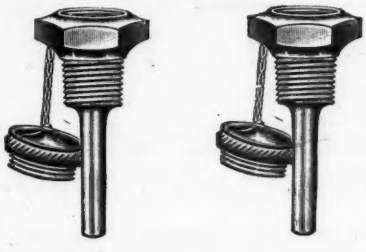

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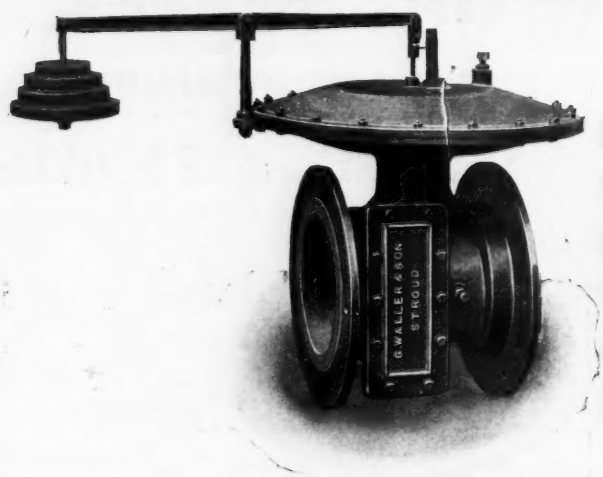

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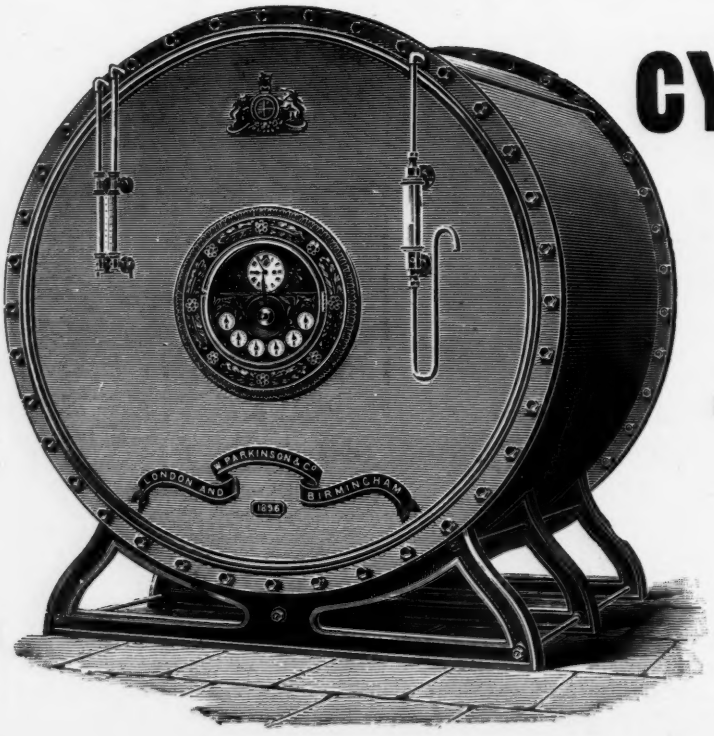

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CIX., No. 2441.—TUESDAY, FEBRUARY 22, 1910.

EDITORIAL NOTES—GAS, &c.

A Gas Demonstration at Shepherd's Bush.

NOT being anticipated, all the more pleasure is there in giving hearty welcome to the enterprise of the London and Suburban Gas Companies in arranging for a demonstration of the applications of gas at the Japan-British Exhibition at Shepherd's Bush this year. The matter was arranged at a meeting of representatives of the Companies, held at the Horseferry Road offices of the Gaslight and Coke Company early this month. It is proposed that the exhibit shall form part of the Decorative Arts Section, and shall be on much the same lines as the exhibit at the Franco-British Exhibition two years ago. A strong Committee has been formed to carry the scheme through. Of this Committee Mr. D. Milne Watson, the General Manager of the Gaslight and Coke Company, is the Chairman; and Mr. F. W. Goodenough, the Chief Inspector of the Company, is the Hon. Secretary and Treasurer. The other members of the Committee, giving the names in alphabetical order, are: Mr. A. E. Broadberry, of the Tottenham and Edmonton Gas Company; Mr. James W. Helps (President of the Institution of Gas Engineers), Croydon Gas Company; Mr. Alex. A. Johnston, Brentford Gas Company; Mr. Stanley H. Jones, Commercial Cas Company; Mr. F. M'Leod, South Metropolitan Gas Company; and Mr. S. Y. Shoubridge, South Suburban Gas Company. The constitution of the Committee is a strong one; and the members may be relied upon to arrange an exhibit that will effectually demonstrate the utility and economy of gas for many of the purposes to which it has application in the dwelling-house and elsewhere. With regard to the financing of the display, satisfactory guarantees have been received from the London and Suburban Companies; and though it is understood that no general appeal for funds will be made, we have no doubt the co-operation of any Gas Company who have sympathy with the project, and would care to assist the Committee in a more material way, would be heartily welcomed. The influence of such a demonstration at a place attracting the public from all quarters cannot be in any way circumscribed. From the above information, it will have been noted that Mr. F. W. Goodenough is the Hon. Secretary and Treasurer of the Committee; and any communications on the subject should be addressed to him at the Gaslight and Coke Company's Offices, Horseferry Road, S.W.

Current Technical and Commercial Topics Viewed from Australia.

THE universality of the gas industry, in its professional and administrative aspects, is brought home to one by such addresses as that with which Mr. P. C. Holmes Hunt, the Engineer of the Metropolitan Gas Company of Melbourne, inaugurated his year of office as President of the Victorian Gas Managers' Association, and which address was published in the "JOURNAL" last week. Of the character of the deliverance, we need say but few words. It carries through it the signs of an innate studiousness and mastery of contemporary technical and commercial knowledge such as, during the outstanding historical years in the development of the gas industry, have been traits associated with the honored patronymic that he bears. It breathes of the progressive instinct of the writer, and of a tight grip of the affairs of his profession. A man may profess and call himself what he will but the independent and irrefragable results of action and work are, and must be, taken as the testimony upon which he is judged. The occasion of the presidency of Mr. Hunt of the first, and at present only existing, gas organization in Australia permits congratulation upon the position he has attained in his profession both in Melbourne and among his Australian *confrères*. The address indirectly tells of the industry by which the position has been won. But further as to the characteristics of the address. Throughout, there is just sufficient local colouring placed upon, and projection of local condition into, the consideration given to British and European gas practices generally to impart an added interest to the views and criticisms of a competent gas engineer so far removed from the homeland. It is seen that the same problems, the same practices, the same drawbacks (accentuated by geographical situation), the same successes (varied by local circumstance and business magnitude), occupy, vex, or cheer, as the case may be, the gas engineer and manager in Australia as here, and keep him ever active.

We find the correspondence in these regards limned from the beginning to the end of the address. Coal worries are ever with us at home. If some actual disturbance of the coal market does not prevail, it is an exceptional period nowadays when there are not rumours of some agitation brewing. Australia has had its measure of trouble in the coalfields full and overflowing of late; and gas-works have suffered in consequence, and their managers have had sleepless nights with stocks run down and deliveries erratic. Apart from the upheaval among the miners, the price of coal there, as here, continues to give anxiety. The price of coal here, there is little risk in saying, will never again reach the low level of prices which gas undertakings knew of old; the price in Australia, Mr. Hunt informs us, is at least 33 per cent. more than it was five or six years ago. Such a rise calls for no comment; its seriousness from the gas maker's standpoint is obvious. It is not, however, only through the acts of the Australian coal miners that prices have been put up to an undue level, but from combination of the coal owners. The Australian coalfields are in sufficiently few hands, and Australia sufficiently sequestered, for combination to be possible without much risk. More the pity for the country and its industries. Nationalization of coal supply is not a thing to be desired; but there ought to be some means of price regulation, so that a country's industry and trade are not brought to the verge of ruin, and people compelled to pay extraordinary rates for manufactured commodities, by the abnormal claims of a comparatively few conspiring owners. However, there are coal developments in Australia. New mines are being opened up; and the more of this sort of thing that goes on the better. The coal from one of the new fields is spoken of by the President as being of good gas-making quality. But there are Australian coals that require packing tight into the retorts for the making of decent coke; and there are other varieties which are of a contrary character, and will not submit to tight packing.

These facts show that the character of the most available coal for gas making must influence future policy in Australia in the matter of the adoption of the newest systems of carbonization and practices. This dominating influence of coal is present in the mind of Mr. Hunt when dealing with heavier and longer duration charges, and with the vertical retort system. His latest installation of carbonizing plant at Melbourne, with the De Brouwer projector, has enabled him to commence experimenting with heavier charges, and twelve-hour working. And the results are, with the class of coal used, nearly 450 cubic feet per ton increased gas production, with a slightly higher calorific power, and a negligible reduction of illuminating power. But the weight carbonizing capacity of the retorts is somewhat reduced. Against this, in addition to the higher make per ton, has to be set the improved coke, and the lessened cost of production. This is highly satisfactory; and it is believed there will be further increase in gas yield as the result of continued experience. Different considerations obtain in contemplating the vertical retort. There appears to be some doubt in the mind of Mr. Hunt as to whether vertical retorts will be capable of making gas of the illuminating quality required in Australia. The

more recent comparative tests at home with the same coal carbonized in vertical and horizontal retorts permit the deduction that what Australian coal will do in the matter of gas quality in a tightly packed horizontal retort will have some approximation with the result that is realizable from vertical retorts. Mr. Hunt recognizes that vertical retorts—whether continuous or intermittent—hold out the prospect of completely revolutionizing retort-house practice, and also, if not to solve, at any rate to lead the way to a solution of, the problem of cheap heating gas. But the doubt as to whether Australia is ripe for the vertical retort finds expression in the statement: "Either it must be demonstrated "that the vertical retort is capable of making gas equal to "our standard, or our standard must be reduced before we "can adopt it, provided always that the coals at our com-"mand will not give better results than those at home."

Here, then, Australian gas administrators have set before them clearly the condition precedent—and this is said notwithstanding Mr. Hunt's proviso—to the full application of up-to-date carbonizing methods, and consequently to the benefit of the revenue account, and, through the revenue account, the consumers and shareholders. For the reduction of the illuminating power standard, or the supersession of that standard by a thermal value one, Mr. Hunt presents, so far as Melbourne is concerned, a very complete and unanswerable case. The day gas output of the works under his charge is, on the average, rather more than 45 per cent. of the total; and, during the summer months, the proportion is above 50 per cent. The part of the night output used for illumination is, he believes, consumed almost entirely in incandescent burners. In fact, he questions whether the latter are used more universally than in Melbourne by gas consumers anywhere in any other country. What longer need then is there for an illuminating power test for Melbourne? There is one thing that we hope Australia will not emulate this country in, and that is in making revision of the illuminating power standard and test a bridge to the inevitable calorific power standard and test. A direct supplanting of the one by the other will, with an appropriate standard and properly defined test conditions, comply exactly with the requirements and conditions of the times. Admitted, however, better the "bridge" than the continuance of the old-fashioned burner and candles—candles used sometimes with the temperature of the testing-room at above 90°—that have sway at present in measuring the illuminating power of gas in Australia. With some 62 companies and 16 local authorities already under the new illuminating power test in this country, and seventy gas undertakings (including those promoting the joint Bills) asking for similar prescription in the present session of Parliament, there is surely plenty of ground for Australia—if the jump to a calorific standard and test seems to be too precipitate—to place its gas undertakings under the modern testing conditions, and thus help to the economies that are pressingly necessary, in the interests of the consumers, in view of the high cost of coal. Fairness to the gas industry also claims a change, seeing that it has to fight a competitor absolutely free in its actions. In this relation, the section of the address treating of the organization of the distribution department of the Melbourne Gas Company is worth reading—one important piece of work to which special attention is being paid by it being the extermination of inefficient modes of gas utilization, the existence of which gives electricians the opportunity occasionally of being cock-a-hoop over savings that it would be impossible to show given modern means of consuming gas for illuminating purposes. This review touches on only a few of the topics excellently treated in the first presidential address of the son of a father who, during his long professional career in the gas industry, has established a record in the number of similar deliverances.

The Message and the Effect.

In one's profession, the importance of being in earnest cannot be too constantly borne in mind; and if one be in earnest, one can hardly fail to be up-to-date. The importance of being up-to-date is no less important to the manager of the relatively insignificant works than to the manager of works of the largest magnitude. The only means that the manager of the works of moderate capacity has of keeping himself *au fait* with what is moving, both technically and commercially, are by diligent study of contemporary technical literature, and by membership of Associations devoted to the interests in which he is concerned. In Australia there is not much scope for professional organization. The Victorian Gas Association has banded together a number of earnest workers, representing the two extremes of works' management in respect of magnitude of undertakings. But dissimilarity of position of the members does not matter. Interests are common, and conference is helpful and instructive to all, though the subjects be more of the detail order than those of higher import. But frequent conference is out of the question there on account of distances. Nevertheless, in the reported deliberations of the Victorian Association, there is found, even among the managers of the smallest undertakings, a knowledge of the most modern practices in British gas-works, and instances of application on experimental or working lines.

Mr. A. G. Ambrose, of Bathurst (N.S.W.), fully acknowledged in his paper his indebtedness to the gas journals for having been the channels by which information was conveyed to him as to how economy could be achieved, and the productiveness of the coal he carbonized be enhanced. The point invites one to pause, and remark upon the duty of engineers, if they have anything worth telling, and personal interest is not affected by the telling, to publish it for the common good. The message may be useful not only to immediate neighbours, but to some fellow-manager working in a place at the far ends of the earth, and isolated from personal contact with those of common interest, except at rare intervals. In the papers and the discussions at the Australian meeting, the benefit of the weekly technical messenger is seen. The information inspires and improves. Mr. Ambrose learns what is being done with governors and tar-towers in improving the conditions under which carbonization proceeds; and an expenditure of £27 enables him to increase his gas make per ton by 7136 cubic feet, to produce gas of more uniform quality, to greatly lower the deposit of carbon in his retorts, and, under the changed conditions, he finds an absence of naphthalene. Compensation for the expenditure was quickly realized. Again, Mr. J. W. Bean, of Wangaratta, shows how by the adoption of generator furnaces in small—"very small" would be better—works, he has increased his make of gas. The information, too, as to the value of the heavier charge has reached these small works; and trials have shown the managers that, even in their restricted way and under their restricted needs, there is advantage in the same practice. Another economy to them from the heavier charge is that, in the summer months, when the demand for gas is low and the carbonizing capacity required is limited, the heavier charge when burnt off assists in maintaining the heats of the settings better than the lighter charges, and thus fuel is saved. In the discussions on these matters, the low quantities of coke produced and sold will strike readers; but the difference in the character of the coal used there and at home, and (in the small works) the comparatively heavy fuel accounts owing to limited operations, should be remembered.

Modern Increased Strength.

The great vitality and strength of the gas industry are in the main to be found in the comparatively modern diversity, on the large scale, of its business. The fact is borne upon one by the address of Mr. Charles Hunt to the proprietors of the South Suburban Gas Company last Friday. The Companies bordering the Metropolitan area all did well in the past half year in the matter of increased consumption, and among them the South Suburban Company added to their output 3·41 per cent. This is the largest expansion of business experienced by them in a similar period for some years past; but, in the relatively slow rate of progress, there is nothing over which to lament. There is probably no gas undertaking in the country that has not in recent years been, though additional consumption has not been up to the old normal level, supplementing, by more or less considerable numbers, consumers, stoves, heating appliances, and engines connected up to its mains. In face of this enlargement of custom, there have not been in all quarters the same percentage increases as formerly, though volume increases may have had closer relationship. The larger increased connection and the slower rate of consumption progress seem somewhat paradoxical. But there is explanation in the fact that these recent years, as Mr. Hunt puts it, have witnessed what has been practically a revolution in the economical methods of using gas—particularly for lighting; and there has, of course, been a certain loss through the competition from electricity suppliers, but not such a loss as has given

satisfaction to the latter. To them the pace is wearyingly slow; and every advance in economical application that the gas industry achieves makes it so much the worse for them. The abnormal years in the matter of a lower rate of increase have been those during which the more economical methods of gas utilization have been establishing themselves.

Again, the superior strength of the gas industry in comparison with its chief competitor is found in the fact that, in respect of cooking, heating, and so forth, the electrical industry is absolutely incapable of substantially establishing itself, with better value and efficiency offering by gas. The South Suburban Company's district is in major part one of the residential areas of London's workers of all classes; and therefore the daylight gas consumption must be largely due to cooking and heating. Mr. Hunt was able to inform the proprietors that the gas consumption during the daytime in the Company's area was now answerable for at least half of the annual output; and the disproportion which formerly existed between the summer and the winter consumption has been reduced by nearly one-half. Here, again, is seen the superior strength of the gas industry in relation to its principal competitor. Through the inefficiency of electricity appliances for heating and cooking, it is not infrequently found too that, in London mansions, where electricity is used for lighting, the gas-cooker and the gas-fire are largely employed; and the gas account for such places has often now a somewhat corresponding value to the days of lighting only. The gas industry has been strengthened immeasurably by the changed conditions that have brought the day and night draft upon the mains to almost equality. This enables plant to be worked more consistently and with greater efficiency, and this again produces economy. More gas, too, is now made per ton; and costs of manufacture —apart from the raw material—are lower to-day than ever they were. Economies of this kind represent much increased strength. These remarks merely emphasize the line of thought that ran through Mr. Hunt's address to the proprietors of the South Suburban Company, whose business served as the illustration.

Glare Again—Electrical Criticism of Metallic Filament Lamps.

A FEW members of the Illuminating Engineering Society met at the Royal Society of Arts on Tuesday last to resume the debate on the subject of "Glare, its Causes and Effects," which had been opened at an earlier meeting of the Society by Dr. J. Herbert Parsons, F.R.C.S., and discussed from the physiological standpoint *ad nauseam*. Professor Silvanus Thompson, who presided, called on Mr. A. P. Trotter, the Electrical Adviser to the Board of Trade, to open the discussion, which was continued by some eight or nine other speakers. The general trend of the debate was in the direction of establishing the unsatisfactory character of metallic filament electric lamps for indoor illumination and of flame arc lamps for public lighting. Nearly all the speakers, the majority of whom were connected with the electrical industry, concerned themselves mainly with explaining by what means the effects of the glare due to metallic filament lamps could be avoided in interiors lighted by them. The intrinsic brilliancy of filaments was said by Mr. Trotter to be practically less than it really is, because the effect of irradiation makes the filaments appear greatly enlarged. This explanation (which is, of course, applicable to all sources of light of high intrinsic brilliancy) does not, however, lessen by one whit the objectionable effect of glare which metallic filament lamps produce. Mr. W. M. Mordey, a former President of the Institution of Electrical Engineers, declared that one could not rest one's eyes in a hall illuminated with metallic filament lamps such as that in which the meeting was held. He went on to say that the "whip-lash" of these bright lights irritated the nerves, and the Institution of Electrical Engineers had come to the conclusion that this "terrible whip-lash" on the eyes of exposed lights must be avoided at all costs in the new theatre of the Institution. This in itself is an authoritative yet, to the electrical industry, humiliating confession of the absolute failure of metallic filament lamps to satisfy the requirements not merely of the general public, but even of eminent electricians in regard to comfortable conditions of lighting.

Other members of the Society devoted their efforts to describing shades and screens by which the objectionable glare from metallic filament lamps could be curtailed or avoided. Others again referred to the glare from flame arc lamps placed outside shop windows. Yet other speakers spoke of the indirect lighting of interiors as eminently desirable, but as too costly. Undoubtedly it is costly if electric lamps are used; for it is only by relying on direct illumination of the objects immediately required to be lighted, that electric lamps for indoor use become reasonably practicable on the score of expense. Anything like general illumination of a room to a sufficient extent to make nearness to the source of light unnecessary for reading or work in general, is an extremely costly matter when electricity is the illuminant employed. Hence the avoidance of glare is a matter that causes considerable worry at the present time to the electrical engineer. To some extent, his difficulty is to utilize to the full the illuminating power of the metallic filament lamp while preventing the clear glass bulbs, which are consequently essential, intensifying the effect of glare from the filament. A great deal may be done to avoid glare from metallic filament lamps if matt bulbs or prismatic shades are used, but these necessarily involve a sacrifice of a large proportion of the light emitted by the filament, and the same degree of illumination consequently becomes relatively and absolutely costly.

Gas lighting has great advantage over the higher-power electric lamps in that the intrinsic brilliancy of the source is less, while the cost of the light is so low that a large proportion may be sacrificed, in order to secure diffuse or indirect illumination without the expense of the lighting becoming prohibitive. Mr. Trotter's contention, that the filament of an electric lamp must not be taken at its actual dimensions for computing the intrinsic brilliancy of the light, may be equally applied to incandescent gas mantles, because the effect of irradiation likewise renders the latter (when incandescent) apparently much larger than they are. The apparent surface area of an incandescent bijou inverted mantle is many times greater than the real surface area of the mantle itself. No one, however, for ordinary uses, thinks of viewing an incandescent mantle through clear glass, except in quite exceptional circumstances. Some form of frosted, opal, prismatic, coloured, or matt-surfaced globe or screen is almost invariably used; and the effects of diffused or indirect lighting are thus obtained at the sacrifice of a small proportion of the illuminating power of the light. Owing to the cheapness of lighting by means of gas, this is a sacrifice which even the poorest can well afford to make in order to avoid the effects of glare. Even a naked gas mantle does not, however, produce the "terrible whip-lash" glare of the exposed metallic filament electric lamp to which Mr. Mordey so frankly referred.

The Largest Gas-Supply Districts.

Speaking in reply to a vote of thanks at the meeting of the Croydon Gas Company on Friday last, Mr. James W. Helps, the Engineer and General Manager, claimed that, with the Company's area of 78 square miles, they had the largest gas-supply district of any Company in the country, excepting perhaps the Gaslight and Coke Company since the annexation of the West Ham Company's territory. Prior to this event on Jan. 1 last, the Gaslight Company's area of supply covered 62 square miles. Such immense areas represent a great deal of work; and there is little time to which the descriptive term "leisure" can be applied for the distribution staffs of the Companies. The members of such staffs have to be constantly on the alert, and here, there, and everywhere.

Practice and Principle.

The difficulty of compiling figures regarding the success, or otherwise, of municipal trading, in such a manner that they may be strictly comparable one with another under the various circumstances that attach to different cases and places, has long been recognized as an obstacle to the satisfactory treatment of the question from a statistical standpoint; and, speaking for ourselves, recognition of the existence of this drawback is not by any means weakened by a dip into the bulky series of Blue-Books on Municipal Trading which have for some months past been making their appearance in solemn procession. One more of these volumes (which it will be remembered were called for by the House of Commons at the instance of Mr. Chiozza Money, who has now, we are glad to say, ceased to be a member of that assembly) was published last week; and its real usefulness, and that of its predecessors, towards solving the vexed problems that surround present-day local government finance, is not strikingly apparent. At any rate,

it seems impossible that it can be proportionate to the outlay that must have been incurred in the preparation of the statistics. On the general subject of the comparison of results of municipal and private trading, Mr. Douglas Knoop, who lately read a paper before the Manchester Economic Society, expresses the opinion that the statistical arguments commonly advanced to show the advantage of the one form of management over the other, are without value; so that he also has evidently felt the difficulty just referred to. In his paper, he discussed four methods of comparison: (1) Taking a particular plant and comparing the charges made before and after municipalization and the benefits otherwise afforded, such as contributions to the relief of the rates and conditions of employment; (2) comparing different plants under municipal and private management; (3) comparing the average results of all municipal and all private undertakings of particular kinds in the country; and (4) making international comparisons between countries where there is much and where there is little municipal trading. He clearly showed how many factors might be present to render valueless any calculations based on the first three methods of procedure; while as to the fourth, he remarked that international comparisons—which in practice become comparisons between the United Kingdom and the United States—are even less trustworthy. Under these circumstances, Mr. Knoop's conclusion is that there seems to be nothing for it but to abandon these statistical arguments, and to determine municipal or private ownership as a question of principle. But who shall decide the question of principle—on which differences of opinion arise, as they do on other matters? Mr. Knoop would not appear to have made any effort to do so. Possibly, however, he is reserving this aspect of municipal trading for consideration on some future occasion.

Local Government Finance.

There has now appeared the last of the eight Blue-Books into which the Local Taxation statistics for the year 1906-7 are divided; and, as is customary, it consists of a summary and an index. Incidentally, opportunity is taken to draw attention to the vast amount of labour that is required in the systematic arrangement and tabulation of the financial transactions of the 25,502 local authorities whose accounts are dealt with. Very few of the returns from which the particulars are compiled can be obtained from the authorities immediately after the conclusion of the financial year to which they relate, as they have to be audited, which takes time. Most of the authorities have their accounts audited by the District Auditors; but where this is not the case, the labour involved in the preparation of the statistics for the Blue-Books is increased, in consequence of the different methods of account-keeping adopted by various authorities. In order that accuracy may be ensured in regard to the figures, all the returns are carefully examined in the office of the Local Government Board; and considerable correspondence takes place with reference to apparent errors, or points on which further information is required. Some notice of the figures relating to the year 1906-7 will be taken in an early issue of the "JOURNAL;" but meanwhile it may be remarked that, in addition to particulars relating to that year, the Blue-Book contains the usual comparative statistics which furnish an interesting indication of what has been the financial tendency during recent years.

Some Comparisons.

In the period which has elapsed between 1899-1900 and 1906-7, the outstanding loans have gone up from £293,864,224 to £494,487,512—the latter figure, however, including no less a sum than £47,407,029 on account of the Metropolitan Water Board. The amount provided during 1906-7 (otherwise than out of borrowed moneys) for the repayment of loans was about £12,500,000, or equivalent to something like a one-thirty-ninth part of the total amount of loans outstanding at the commencement of the year. During the twelve months, the loans outstanding increased by £11,500,000, which is smaller than any annual increase that took place between 1897-8 and 1906-7. In fact, the £20,393,901 raised in that year was some £4,000,000 less than the figure for 1905-6; and the decrease affected most of the more important classes of work for which local authorities borrow. A falling-off of £1,168,184 is shown under the head of highways and street improvements, and £1,027,196 for electric light undertakings. Of the total outstanding, over 50 per cent. is on account of revenue earning departments. Including the Metropolitan Water Board, the average sum per pound of rateable value of loans outstanding has increased from £1 13s. 6d. in 1899-1900 to £2 7s. 9d. in 1906-7; and per head of the population, from £9 4s. 4d. to £14 16s. 3d. The average amount per pound of valuation of public rates raised has gone up from 4s. 11·8d. to 6s. 1·22d.; and per head of the population, from £1 5s. 7d. to £1 14s. 6d. In the same period, the total amount received from rates has risen from £40,734,219 to £59,557,199. While in the same seven years the amount of the outstanding loans on gas-works has gone up from £19,819,301 to £23,550,765, that for electric light undertakings has grown from £7,853,061 to £28,218,444. The receipts from gas-works have in the same period increased from £6,035,526 to £7,150,028; those from electric light undertakings, from £910,329 to £3,094,989; and those from water-works, from £3,730,219 to £4,615,664. The total receipts have gone up from £77,202,175 to £117,898,553. In 1899, the rateable value of property assessed to local rates was £175,622,758; and in 1996 this figure had increased to £207,067,675. The growth of the last two groups of figures, it will be noticed, is not in the same proportion as the increase in the outstanding loans.

PERSONAL.

This year's President of the Dutch Gas Association is Heer J. VAN ROSSUM DU CHATTELL, of the Haarlemmerweg Gas-Works, Amsterdam; and the Secretary, Heer N. W. VAN DOESBURGH, of Leyden.

At the recent half-yearly meeting of the Aldershot Gas, Water, and District Lighting Company (noticed elsewhere), Mr. A. F. WILSON, the Chairman, announced his intention of relinquishing this position, after occupying it for twenty-eight years. He will, however, remain a member of the Board. He gave as a reason for his resignation his age and the affairs with which he is connected elsewhere. He thanked the shareholders for the uniform courtesy they had shown him, and for the support they had always given him. He said that during the whole of the time he had been Chairman he did not recollect any acrimonious speech at their meetings.

At a meeting of the Beccles Gaslight and Coke Company last Tuesday, to consider the filling up of the vacancy caused by the resignation of the Engineer and Manager, Mr. CLAUDE CLARENCE CARPENTER was appointed to the position, from among 97 applicants. Mr. Carpenter is a son of Mr. W. J. Carpenter, Assoc. M.Inst.C.E., Engineer and Manager of the Great Yarmouth Gas Company, whose works he entered, on leaving school, as a pupil under his father. He has for some time past been engaged as Assistant-Engineer there. Mr. Carpenter was educated at Yarmouth, and followed up his scholastic studies with a course of instruction at the Corporation Technical Schools.

The last issue of our contemporary, "Il Gaz," reports that Sig. Comm. Ing. POUCHAIN is retiring from the Anglo-Romano Gas Company after the long period of over forty years spent in their service. At first he held some subordinate positions in gas-works at Paris and Lyons, but afterwards went to Naples, where his father was then the Manager of the gas-works. Leaving there, he was appointed Engineer at Rome, and has raised himself to the high position he has so long honourably occupied at the head of the gas undertaking there. We understand his experience will still be at the disposal of the Anglo-Romano Company; for Sig. Pouchain will remain as consulting technical adviser. His place as Managing-Director will be taken by Sig. Ing. MARCELLO DE JONG, a native of Holland, who has proved himself an able Assistant-Manager of the Rome Gas-Works since July, 1908.

OBITUARY.

We regret to learn that Mr. SAMUEL J. ACLAND, the eldest son of Mr. Thomas Acland, died at Newport last Saturday. The deceased gentleman was 34 years of age.

We are sorry to announce the death of Mr. EDMUND LORD, Manager to the Whitworth Vale Gas Company, which took place on the 16th inst. Mr. Lord, who was in his 64th year, had a serious illness two years ago, from which he never thoroughly recovered. It was in 1864 that he entered the service of the Whitworth Vale Gas Company; and after a period of six years spent in the office, he was appointed to the position of Manager, in succession to Mr. Charles Lord. He was the oldest member, as well as Hon. Treasurer, of the Keystone Lodge of Freemasons, Whitworth; and his quiet and unassuming disposition made him many friends in the craft, and in the gas profession. To the widow and two sons have come numerous letters expressing sympathy with them in their bereavement. The interment took place on Saturday, at the Whitworth Parish Churchyard.

THE CASE FOR THE STANDARD BURNER BILL.

[COMMUNICATED—CONTINUED FROM PAGE 416.]

ALL the grounds of objection which, so far as is known publicly at present, have been raised to the provisions of this Bill, have been discussed in the earlier instalments of this article; and it has been shown that none of them is capable of being maintained in the face of the evidence the promoting Companies should be in a position to call. Whether, in the event of the opposition to the Bill being pursued as far as the Parliamentary Committee Rooms, the evidence given for the Gas Companies will in fact be covered by the arguments adduced in this article in favour of the Bill is, of course, improbable, as the author has presented merely his own opinions. He has not had the advantage of conferring with the promoters of the Bill, or otherwise gaining any direct information as to their case. Granting that there is wisdom in a multitude of counsellors, it is certain that the promoters will be able to present a much stronger case for the Bill than that which an unaided individual has outlined in this communication. Yet, even without the additional arguments and evidence in favour of the Bill which the many highly experienced and trained engineers and experts connected with the promoting Gas Companies will undoubtedly adduce, it must be evident that the case for the Bill, as here presented, is extremely strong. This will be perhaps more readily apparent from the following summary of the conclusions drawn in the previous instalments of this article.

The Bill provides that the standard burner for use in the statutory testings of the illuminating power of the gas supplied by the promoting Companies shall be the "Metropolitan" argand burner No. 2. The author has learnt, from information supplied to the Editor of the "JOURNAL," that the standard burners prescribed at present are: For 43 of the undertakings represented by the promoting Companies, Sugg's "London" argand No. 1; for four of the undertakings, an argand with 15 holes and a 7-inch chimney; for one undertaking, the "Wandsworth" argand; and for another undertaking, a batswing or fishtail burner consuming 5 cubic feet of gas per hour. Excluding the last-named case (Liverpool), where, owing to the richness of the gas supplied, the early argands were impracticable for use, no justification can be found for the want of uniformity here displayed in the type of burner prescribed. It cannot be confidently alleged that Parliament prescribed one burner for (*e.g.*) Brentford and another for (*e.g.*) Croydon, in order that the definition of gas of a stated illuminating power might be different in the two places. The particular burner prescribed in each case was a mere accident of the date of the Act or Order when the prescription was made. The intention of Parliament throughout has clearly been to confer on all companies the right to have the illuminating power of their gas tested through the burner which is most suitable for obtaining from the gas the greatest amount of light. This intention has been explicitly stated in the Acts of 1868, 1869, and 1905 relating to the Metropolitan Gas Companies, and it was undoubtedly believed at the time of its prescription that the prescribed burner for each of the 49 undertakings of the promoting Companies fulfilled this intention in regard to them also. Now that it is known that the prescribed burner no longer fulfils this intention, the Companies are appealing to Parliament to revise the prescription, and so bring it in line with the principle established in the Acts named above, and adopted directly or indirectly in other Acts and Orders—viz., that the burner used in testings of the illuminating power shall be that most suitable for obtaining from the gas the greatest amount of light. According to present knowledge, that burner is the "Metropolitan" argand burner No. 2.

The use of the burner which is most suitable for obtaining from the gas the greatest amount of light has hitherto been granted by Parliament as a right of the gas undertakings concerned; and no reduction of the standard price chargeable for gas has been imposed on the companies, which from time to time have been granted the use of such a burner, by way of compensation for any benefit that might accrue to them therefrom. The London Gas Act, 1905, which explicitly restored to the Metropolitan Gas Companies the right (which had stood in abeyance for a number of years owing to the misconception that finality in the construction of argand burners had been reached with the "London" argand No. 1) to the testing of illuminating power with the burner most suitable for obtaining from the gas the greatest amount of light, made no alteration in either the standard price or the prescribed illuminating power of the gas of these Companies. Parliament cannot reasonably be asked, in granting the same right to a number of relatively small Provincial Gas Companies, to exact from them compensation in any form, when it exacted none at all from the large Metropolitan Companies.

The whole of the grounds of opposition to the Bill are really disposed of by this one consideration. The promoting Companies are asking for no more than Parliament has already granted unconditionally to the Metropolitan and a number of other gas undertakings; and gas legislation for the Metropolis has hitherto always been much more stringent in regard to conditions of testing than gas legislation for provincial centres. If, however, other justification is asked for the prescription of the "Metropolitan" argand burner No. 2 as the standard burner for testing the illuminating power of the gas supplied by the promoting Companies, it may be found in the fact that the illuminating power thereby ascertained varies, as the quality of the gas rises and falls, strictly in correspondence with the light obtainable from the gas in flat flame burners. The testing burners now prescribed for the promoting Companies do not give results which similarly rise and fall in correspondence with the light afforded by flat-flame burners. Since the object of maintaining testings of illuminating power must be mainly, if not wholly, the protection of consumers who continue to use flat-flame burners, the adoption of the "Metropolitan" argand burner No. 2 is justified on its merits from the standpoint of the consumer.

There is no justification for the suggested imposition of a standard of calorific power at the present juncture. A standard of calorific power has so far been applied to only one Gas Company—viz., the Gaslight and Coke Company. This Company agreed to the prescription of a standard of calorific power in consideration of the obtaining of certain concessions. It had secured the prescription of the "Metropolitan" argand burner No. 2 for the testing of the illuminating power of its gas four years prior to the prescription of the standard of calorific power. The two prescriptions were therefore absolutely independent; and the promoting Companies have a right to expect that, in their case also, the prescription of the "Metropolitan" argand burner shall be considered quite apart from any proposal for the imposition of a standard of calorific power. Such a proposal, if raised at all, should be embodied in another Bill or other Bills. If and when it is raised, the promoting Companies will reasonably ask for a probationary period of at least four years duration, during which testings of calorific power may be made "for information only." After the lapse of this period, they and the local authorities will be in a position to judge what is a reasonable standard of calorific power for the particular case. It would be monstrously unfair to expect any of the promoting Companies to work to a standard of calorific power without having had the advantage of a preliminary course of "information" testings extending over at least as long a period as the four years which was allowed therefor to the Gaslight and Coke Company, with its unique facilities and organization.

It has further been shown that the imposition of a standard of calorific power is unnecessary for the protection of the consumer at the present time, since no appreciable reduction in the calorific power of the gas supplied can occur until there is a considerable reduction in the prescribed illuminating power. The promoting Companies are not in this Bill providing for any reduction in the prescribed illuminating power. Thus, both on precedent and on merits, there is no case on the present Bill for the prescription of a standard of calorific power for any of the Companies.

The other grounds of objection to the Bill are not of sufficient importance to call for further notice. Broadly, the provisions of the Bill are such as Parliament has already embodied in many Gas Acts merely as a measure of justice to the gas undertakings concerned. The promoting Companies expect to receive similar meed of justice from Parliament. The local authorities which are arranging to oppose the Bill should bear in mind that in doing so they will be attempting to perpetuate an inadvertent act of injustice to the Companies, whose interests are closely identified with those of a very large number of the citizens and ratepayers represented by the various local authorities. If it could be demonstrated that the provisions of the Bill will afford any gain to the Companies, it would have to be remembered at the same time that all, or nearly all, the gain would be passed on to the consumers of gas. The provisions of existing Acts and Orders which are untouched by the present Bill establish and ensure this community of interests as between gas companies and gas consumers.

Vertical Gas-Retort Proposals for Rochdale.

The Sub-Committee of the Rochdale Corporation Gas Committee who, along with Mr. T. B. Ball, the Gas Manager, have visited recently several places where vertical retorts are in use, presented their report to the General Committee last Wednesday. The Sub-Committee have seen the Glover-West vertical retorts operating at the St. Helens Gas-Works, the Vertical Gas-Retort Syndicate's installation at Sunderland, and Messrs. Woodall and Duckham's retorts in London. They now recommended that Messrs. Glover and West, Messrs. Woodall and Duckham, and the Vertical Gas-Retort Syndicate be invited to send in tenders for an installation capable of carbonizing 100 tons of coal per 24 hours. This recommendation was agreed to by the General Committee; the Sub-Committee being authorized to receive and examine such tenders when sent in. It will be remembered that the Rochdale Gas Committee in December last approved of plans for extensions at the works prepared by Mr. Ball; the proposals including one for the rebuilding of the old retort-house, and the introduction of vertical retorts. The extensions are estimated to cost about £25,500.

The third monthly meeting of the Commercial Section of the Southern District Association was held last Thursday at No. 39, Victoria Street, S.W.—Mr. W. E. Price, of Hampton Wick, in the chair. A discussion on hiring and hire-purchase occupied the greater part of the proceedings.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 524.)

Business last week in the more speculative quarters of the Stock Exchange—Rubbers, for instance—was most brisk; the public being in a very catchable humour. But taking departments all round (both lively and sedate), the volume of activity was not great, and at times things fell quite quiet. Towards the close, owing to the extreme difficulty in making any forecast of the political cat's jump, the tendency was rather to lie low and do nothing. However, the opening day was pretty bright. The chief markets were firm; and Rails advanced on more peaceful coal prospects. Tuesday was a quieter day; but the favourable tendency was maintained. Wednesday was more active, and the tone was distinctly good. Consols met with support; and several Railway issues were higher. The Foreign Market was generally strong. Business fell back quieter on Thursday; but the firm attitude was maintained. The gilt-edged division profited by cheap money; the other leading lines were firm. On Friday, there was a change; the obscurity of the political horizon was oppressing, and there was reluctance to launch out in the dark. Dullness and some flattening of prices was the mark pretty well all round. Saturday was much the same. Caution was the order of the day; and business was restricted and dull. The Money Market was very easy throughout; and the week closed without any sign of a change. Business in the Gas Market was unusually brisk and active, and quotations were full of strength. More conspicuous even than usual was Gaslight and Coke ordinary, which had quite a busy week. On Monday, it changed hands at 103¾, from which point it rose steadily to 105¼—the quotation being 1 up. In the secured issues, the maximum marked 88 to 88½, the preference from 103 special to 104¾ (a rise of 1), and the debenture 82½. South Metropolitan was quiet and unchanged. Transactions ranged from 119¾ to 121; and the debenture marked 82½. Little was done in Commercials—one deal in the 3½ per cent. at 105, and one in the debenture at 81. Among the Suburban and Provincial group, Brentford old changed hands at 258; but nothing else in the London list was touched—a record of inactivity. In the Provincial Exchanges, Chester fetched 110, Liverpool "B" 167 and 168, and the three Sheffields 234 apiece. In the Continental companies, Imperial was only moderately dealt in at from 175 to 176½, ditto debenture marked 91¼ and 93, Union 97, ditto preference 138¼ and 138¾, and European part-paid 18½ and 18⅝. Among undertakings of the remoter world, the most noteworthy feature was the further advance in the quotations of the three amalgamating Companies in Buenos Ayres, coupled with considerable activity in the shares of one of them. The result is that they now figure at prices rather dearer than those of several choice home companies. Buenos Ayres was done at 14½ (a rise of ½), Primitiva at from 7⅜ to 7¾ (a rise of ⅛), ditto preference at from 5⅜ to 5 15/16 (a rise of ⅛), ditto debenture at 99, and River Plate at 17⅛ (a rise of ¼). Other dealings were in Monte Video at 12⅞, and in South African at 12⅝.

ELECTRICITY SUPPLY MEMORANDA.

The Imperfections of Cooking and Heating Appliances—An Unattractive Cooking Outfit—Lighting Consumers and the Power Load—Metallic Filament Prices—The Odd-Job Man—Defective Installations Passed by Supply Authorities.

In the past, there have been many unfounded claims as to electrical appliances for cooking and heating having reached a practical and efficient stage. It happens that experience has not been altogether consistent with statement; and those who have been honest enough to say so, if ranked among the competitors, have had hard things said about them for their trouble. Memories crowd upon us. But we are pleased to know that the unreliability of electrical appliances has become so notorious that the electrical papers now appear to be agreed that there is nothing to be gained by pretending that the position is otherwise. It is openly confessed that, both in respect of durability and perfection, electrical cooking and heating appliances leave much to be desired. The writer of "Installation Topics" in the "Electrical Times" upbraids manufacturers for their slowness in producing really practical apparatus. This is what is said: "Though electrical cooking and other heating apparatus has been on the market for a number of years, manufacturers in some cases do not seem yet to have designed these articles with a view to their use under everyday domestic conditions. Perhaps these makers never use their own goods, or surely they would find out, and eliminate, their weak points." The last remark has a particularly nasty smack about it. The "Electrician" is not so severe upon the manufacturers. It was, according to our contemporary, "in the early days, in spite of statements to the contrary, that much of the electric heating and cooking apparatus was unsuited for serious work." From which, it may be taken that we are expected to infer that the "unsuitable-for-serious-work" condition is now completely overcome—in fact, it is said later, "the unfortunate state of things has now been changed." But still any confidence these brave words may have stimulated is dissipated the succeeding week in our contemporary's "Industrial Supplement," in which it is read that "among the firms who have contributed their quota to the advance of electric heating and cooking apparatus towards a state of perfection—*a state, however, which still seems some way off*——." We may stop there without attempting to consider the virtues of the goods of the firm who have contributed their quota to advance. But when statements such as those quoted here are made in the technical electrical press, we wonder of what use was that great torrent of words recently advocating greater activity in the matter of domestic electrification. If the cooking and heating appliances still contain so many defects, and are so far off perfection, then to palm them off on the unsuspecting householder as something worthy of his highest regard is to obtain business under false pretences. In the "Installation Notes" already referred to, a column of criticism is written, most of it calling attention to defects in the apparatus. Even so, the indictment is incomplete, inasmuch as "much more might be written on the question of weak points in the design of cooking and heating apparatus. But enough has been said to indicate that makers might do worse than overhaul their existing patterns, and carry out such improvements as are needful to make them thoroughly sound commercial articles."

Some time ago we noticed the "Tricity" cooking outfit, which, on being introduced to notice, was, in the customary manner, promptly placed by our contemporaries among the goods that promised to work marvels. Then the price of the output was so reasonable that nobody would be without one. But alas! the inflated hopes of the time were, like bubbles from a clay pipe, destined to speedy collapse. It is acknowledged now that hitherto the price of the apparatus has placed it beyond the reach of the majority of users [*sic*]. They are not "users" if they have not got the apparatus. But the term was, of course, *a lapsus calami* on the part of the contemporary whose reference to the subject is now before us. The point of this reference is that the makers have decided to offer the complete "Tricity" outfit, comprising the cooker itself, and some eighteen utensils—including ovens (plural), grill, saucepans, and kettles—for £7 15s. This is a long price; but still it is less than half the former price. And at £7 15s. it is "probably the cheapest electric cooking outfit on the market." Besides the old price which prevented the adoption of the "Tricity" outfit by the million, there was it seems, another objection. It had grave limitations. It could do almost anything except roast meat or bake pastry. It could boil, stew, fry and grill, heat flat irons, and air clothes, but it was unequal to those two great essentials—the roasting of meat and the baking of pastry. This shortcoming has now been met by the introduction of an oven, which fits over the hot-plate, and which has a capacity of about a cubic foot, which is large enough to take a 6-lb. joint, puddings (plural), or pastry. Provided the hot-plate is already warm when the oven is placed on top, a temperature of 300° to 400° Fahr., it is stated, can be obtained in about six minutes—the rate of consumption of electricity being less than a unit. Those are the statements. This necessary adjunct to the "Tricity" outfit is listed at £1. When it is found that householders still look askance at the price of £7 15s., and continue to pass by to the side of the gas competitors, we take it it will then become a question as to whether it will be worth while making the outfit, as we read that the price now named can "only prove remunerative if the cooker is supplied in large numbers."

The "Electrician" has been writing in justification of a lower price per unit for power than for lighting business. Justification is not required for a reasonable difference; but electrical undertakings have dug such an absurdly big gulf between the prices for lighting and power, that justification is completely lost in it. All, or the greater part of, the economies produced in connection with an electricity undertaking have been swallowed up in trying to develop the power consumption; and it is not denied that the lighting consumer, generally speaking, in respect of price, has received little consideration. But lighting consumers are asked to believe that they ought to find their reward in the greater efficiency of the lamps they use, and to feel benevolently inclined towards the power consumer who more than absorbs all the economies effected—very largely through the patronage of lighting consumers as a whole. And why? Because cheap current is said to attract business to towns. This is all very well; but it is not such a tangible reward to the individual consumer as a reduced price for the commodity he purchases. It must be remembered that there are many undertakings that could not exist without the lighting consumers, but which could exist without the power consumers. The whole argument is surrounded by limitations. There is a limit to business and industrial occupation requiring power; the law of demand attends to that. This being so, cheap current cannot be expected to be magnetic in all towns; and, as a matter of fact, there are few that are favoured according to their deserts as measured by the fine fractional prices charged for current. "Ultimately, the undertaking, when it has obtained a very large power load, is able to supply other consumers at a much lower price." For many towns, the "ultimately" and the "very large" may refer to ages to come, and so therefore may the "much lower price." "Apart from the considerations mentioned, however," proceeds our contemporary, "there is no doubt that lighting consumers are, as a rule, not penalized by this policy; and, in fact, they may obtain considerable benefit from the improved load-factor, and reduced cost of generation resulting from the additional load." The use of the word "may" indicates that the "considerable benefit" is extremely problematical. And, indeed, it is difficult to trace in the majority

of towns—and the majority are those with a restricted power demand—that the lighting consumer derives any benefit whatever from the power "load;" steadfast prices indicating rather the reverse. To cite the industrial district of West Ham in support of our contemporary's argument, is about on a par with quoting Newmarket as an instance giving support to the adoption by other towns of a racecourse. One case is insufficient to constitute a commercial principle; it may merely be the exception to a salutary rule.

According to the "Electrical Review," a break-up of the prices of metallic filament lamps has just commenced in Germany. There must be a limit to the breaking-up of prices in view of the expense of constructing the lamps, as, if the process is carried too far, there will not be (as has been found in other branches of electrical enterprise) much profit left for the makers. The present downward move of prices, it appears, was started, through the action of the Deutsche Gasglühlicht (Auer) Gesellschaft, in putting forward a scheme to increase the share capital of the undertaking from £650,000 to £1,300,000 for the purpose of developing the incandescent gas mantle departments, in consequence of the prevalence of stronger competition in this particular line of production. Although there was hostility to this scheme of capital duplication powerful enough to cause the Directors to withdraw it, the proposition shows that they, at all events, see a good prospect for the further development of the incandescent mantle business—the opulent success of which has drawn into it many substantial manufacturers. Simultaneously, the Company announced that the growing rivalry in the metallic-filament lamp trade (in which they claim to be the oldest makers) rendered it necessary for them to promote the bulk manufacture of Osram lamps, in view of the prospective reductions in prices. This they can do without raising further capital. However, war in the matter of prices has now seriously commenced in Germany, as it did in this country some months since.

The "Electrical Review" has solemnly averred that "the wire lamp has changed the whole illuminating practice very much in favour of the electric light instead of gas." This is a categorical assertion on the part of our contemporary that has about as much justification behind it as the "long shots" that were witnessed in the general press recently respecting the probable reconstitution of the Cabinet. If the statement were true, why is it the Directors of the Deutsche Gasglühlicht Gesellschaft were so foolish as to propose such a large capital expenditure for the development of the incandescent mantle business? If true, whence comes the large increase of gas consumption that has been witnessed in Germany during recent years? If true, why the large capital expenditure that has been, and is being, witnessed in Germany on new gas-works plant? These are pertinent questions that require an answer from the daring writer. He further goes on to assert that in Germany the demand for metallic filament lamps is at present so large that all the factories are sufficiently provided with orders to find full employment. This, too, is rather a loose statement. "The demand" is not confined to Germany, but includes all those metallic filament lamps that are made in Germany, and are dumped into this and other countries. Still, as we read on, we see that the supply is likely to overtake the demand, inasmuch as "the probability of over-production will have to be reckoned with in the future."

Recrimination has been running high of late between some of the electricity supply authorities and the contractors for wiring and fitting. The latter naturally want to keep the wiring and fittings business in their own hands; the former say that the latter are stumbling-blocks to the electricity supply business, partly through the antagonism of interests, and partly because the contractors have not the means or the power to develop the electricity business. Now the contractor blames the odd-job man and the supply authorities for much of the odium that has fallen upon the electricity industry; but we do not think the palatial establishments that have suffered from fire lately were wired by the odd-job man. The class of men who come under the reproachful designation are the plumber and the bell-hanger, who will take on any electrical installation work that people will entrust to him. Where the supply authorities come in in connection with this class of contractor—pardon! we should have written jobber—is in passing, in a most perfunctory manner, the installation work that they do. If all that Mr. E. H. Freeman says on this point in the "Electrical Review" is correct—and we have no reason to doubt him, in view of the illustration he furnishes—the supply authorities are guilty of gross negligence in their business. Mr. Freeman's indictment is one that is not to be readily dismissed. He says that it is the casual and useless insulation test, and the entire absence of proper inspection of the installation on the part of the supply authorities, that makes it possible for these small odd-job men to go from job to job. "A regular refusal to connect up a defective installation would put an end to this class of contractor; and his continued existence is largely due to the deplorable laxity of the supply authorities." As this matter is being considered, a vision of that mass of wiring rules and regulations bearing the imprimatur of the Institution of Electrical Engineers rises before our eyes; and the recently revised version of the rules and regulations of the Phœnix Fire Office also comes within view.

There is no gainsaying that Mr. Freeman proves his case when he can quote, as he does, ghastly examples of installation work that have been passed as satisfactory by some supply authorities, who, by their reprehensible carelessness, impose upon the public, and give assurance of safety where the greatest danger actually exists. We ask pardon for quoting the examples without permission. They are most instructive. "(1) A 7/22 wire carrying 68 carbon lamps on one circuit without any fuses, and with eight or nine joints in less than 12 feet. (2) Unprotected wires run between floors without casing or tubing. (3) A pair of live wires cut off with pliers, and left unsealed and alive, with the copper quite exposed, and the two conductors not ½ inch apart. More than a dozen such ends were found in one house, and had been there for months at least. (4) Flexible cord run unprotected between floors; many points being thus wired. (5) Flexible cord run in casing and tubing, again to many points in one house. (6) A main switch, fuses, and meter fixed immediately over a large hot-water boiler, and within 3 feet of the top of it. (7) Submains and other cables insulated with rubber tape only (exactly like bell wire), and then laid up with cotton yarn to look like ordinary cables—these on 240 volts connected to the mains of a supply authority with some of the most stringent rules existing—on paper. (8) Flexible cord buried in plaster without any protection whatever. (9) A combined gas and electric light fitting wired with flexible cord threaded in and out of unbushed holes in the brass tube of the fitting—this in a large City office rewired within the last three months." On the very day on which Mr. Freeman was writing, he saw a 1-horse power motor on 400 volts with absolutely unprotected terminals; with the wiring run in unearthed tubing; and with the motor itself not earthed, and wiring to another 400-volt motor run in wooden casing almost entirely devoid of capping—all within 100 yards of Holborn Circus, and in a building which an insurance company's inspector had visited within a few weeks. This kind of thing, he declares, is by no means uncommon. The indictment cannot be regarded as other than a serious one; and it may well be asked, In whom is the electricity consumer to place his trust in regard to the safety of his installation?

AN AMERICAN TREATISE ON THE GAS-ENGINE.

There has lately reached us from the other side of the Atlantic a work dealing with the various types of internal combustion engines which may be recommended both from the practical and theoretical standpoint.* The contents are of an extensive nature; the pages numbering no less than 447. So much of the information included in the volume is obviously inspired by personal observation that the value to the reader is thereby considerably enhanced. The author explains that while the illustrations are, with one or two exceptions, representative of American practice, the text is based on operating experience in Germany, Belgium, France, and England, in addition to his native country America.

It should be explained that the volume deals with both gas and oil engines, and from the student's point of view it may be suggested that the descriptions of the two types of engines might have been more clearly separated. In some parts it is rather difficult to grasp to which type of motor the author is referring; and it is conceivable that this would appear confusing to the novice, especially as a certain amount of elementary knowledge is assumed.

Insufficient attention is given to the use of coal gas as a gas-engine fuel. This may possibly be accounted for by the fact that in America the manufacture of coal gas has not, with a few notable exceptions, been developed to the same extent as in this country. The price of coal gas is high, and, besides, the gas coals are not, generally speaking, so numerous nor so good as in England. It is a noteworthy fact that in towns—and a good many in England are included in this category—where gas for power purposes is sold at 1s. 6d. per 1000 cubic feet, or thereabouts, producer plants have made little or no progress.

The volume, which is composed of 21 chapters, is well indexed. The chapters are conveniently divided into sub-headings, all of which are descriptive of the contents, and are separately numbered. By this means, reference may be readily made to any particular subject.

Several of the chapters do not call for special comments beyond the statement that the subject-matter is throughout discussed in a decidedly practical manner. Chapter III., on "Ignition," is complete and most instructive. The amount of information contained in this and the following chapter, on "Control of Power and Speed," is a notable feature of the whole work, and will amply repay close study. The same remarks apply to two later chapters on "Starting and Adjusting the Motor" and "Theoretical Heat Cycles." A great deal of useful information of a sort particularly suitable to the user is contained in the three chapters on "Troubles, Remedies, and Repairs," "Lubrication of Motor," and "Cleaning and Miscellaneous." Several of the concluding chapters deal from the theoretical aspects with the gas-engine and the various fuels used therein.

The work under notice will well repay perusal, especially by those in charge of gas and oil engines. It is full of that practical information which is so necessary to proper and economical running, and which is so often unfortunately lacking in users of the gas-engine.

* "The Gas-Engine." By Professor Forrest R. Jones. New York: John Wiley and Sons. London: Chapman and Hall, Limited.

WATER LEGISLATION FOR 1910.

In preceding issues of the "Journal" the principal features of the Gas Bills and Provisional Orders for the session just opened have been noticed. We to-day deal with the Bills relating to water supply; taking first the measures brought forward by Companies.

The Cambridge Water Company are applying for authority to construct new works in the rural district of Chesterton, in the county of Cambridge. They will consist of a reservoir on land in the vicinity of the existing reservoir at Cherryhinton, a pumping-station adjoining the present one there, two others, two adits, and two pipe-lines in connection therewith. Ten years are asked for the completion of these works. The Company wish for power to construct the necessary works for the purpose of sterilizing or otherwise treating the water taken by them, and supplying it to the owner or occupier of any house, or to any local authority or other consumer taking or requiring a supply from the Company. Additional capital to the amount of £180,000, including premiums, is applied for; but the Company will not raise by the issue of preference shares or stock a greater amount than £90,000. The new capital is to be sold by auction or tender, and the dividends are limited to 7 and 6 per cent. per annum on the two classes. Borrowing powers to the extent of one-third of the additional capital are required. It is proposed to alter, as from June 24, 1911, the rates for a supply of water for domestic purposes. Where the annual value of the premises supplied does not amount to £6, the rate is to be 8s. 8d. a year; above this the charges range from 7½ down to 6 per cent. per annum, according to the annual value. Authority will be sought to purchase or take on lease houses, cottages, and other buildings for persons in the Company's employ, as well as offices and other buildings for the purposes of the undertaking; and also to erect, maintain, and let any such building upon any lands for the time being belonging or leased to the Company. [*Parliamentary Agents: Messrs. Rees and Freres.*]

The Bill promoted by the East Grinstead Gas and Water Company is to obtain confirmation of the construction of their works at Hackenden, and authority to extend and improve them. These works consist of wells, an adit, and a pumping-station, situated partly in East Grinstead and partly in Lingfield, and two aqueducts or pipe-lines in connection therewith. The Company also require power to make new works, comprising a well and pumping-station in the parish of Forest Row, a service reservoir and a water-tower in the parish of East Grinstead, and three aqueducts or pipe-lines in connection therewitb, to be completed in five years; also to acquire by agreement, from Mr. H. Hepburn Hastie, the well and water-works now in course of construction on the estate known as Place Land, and complete them for the purposes of the undertaking. The Company ask to be allowed to raise additional capital to the amount, including premiums, of £40,000, not more than £20,000 (nominal) of which is to be issued as preference capital; and the two stocks are to be entitled respectively to 7 and 6 per cent. per annum dividend. Power to borrow to the extent of one-fourth of the additional capital, as well as to create debenture stock, is required. The Bill contains provisions in regard to the protection of the Company's works and supply, and to the sale of water to or by outside parties. [*Parliamentary Agents: Messrs. Rees and Freres*].

Authority is sought for the incorporation of a Company with power to acquire the undertaking of the Kingswood Water Company, Limited, which was established on July 9, 1908, for the purpose of supplying water within the parish of Kingswood, in the county of Surrey. The original capital was £15,000, in £10 shares; and 440 shares have been issued and are fully paid up. There is a debenture debt of £2000. The promoters of the Bill ask for authority to raise, in addition to the original capital, £5000 in ordinary or preference shares or stock, and to borrow to the extent of one-third. The new Company will acquire the existing works, comprising a well and pumping-station in the parish of Reigate and a pumping-station in the parish of Kingswood; and they ask for power to construct another station and reservoir, a water-tower, two rising mains, and two lines of pipes. These works are to be completed within two years from the passing of the Act. The rates for the supply of water for domestic purposes, including one closet, range from 11s. up to 5 per cent. per annum, according to the annual value of the premises; the minimum being 10s. The Company wish for authority to supply water in bulk and by measure; and the price in the latter case will not exceed 2s. 3d. per 1000 gallons. For every closet beyond the first the charge is to be a sum not exceeding 11s. 3d. per annum; and for every fixed bath, filled to the extent of not more than 50 gallons, 22s. 6d. per annum. The Bill contains a number of regulations for preventing the waste of water; and also a clause to enable the Company to sell their undertaking to any local authority whose district may be within their limits of supply. [*Parliamentary Agent: Mr. Herbert Deane.*]

The object of the Maltby and Tickhill Water Bill is to incorporate a Company for the supply of water in the parish of Maltby, the urban district of Tickhill, and certain adjacent parishes in the West Riding of York. The proposed capital is £25,000, in £5 shares; and authority is sought to borrow to the extent of one-third of the amount of capital raised at the time of borrowing, and also to create debenture stock. The limits of supply are, in addition to the above-named parish and urban district, the parishes of Braithwell, Hooton, Levitt, and Stainton. It is proposed to construct a well and pumping-station in the parish of Maltby, a line of pipes connecting them with a water-tower, and another conveying the water to its destination. A period of five years is asked for the completion of these works. The rates proposed to be charged range from 8s. 8d. up to 5 per cent. per annum, according to the rateable value of the premises supplied, with an addition of a sum not exceeding 5s. for every closet beyond the first, and 7s. 6d. for every fixed bath holding not more than 50 gallons. The charge for water if supplied by measure is not to exceed 1s. 6d. per 1000 gallons, with a minimum payment not exceeding 10s. per quarter. Authority is sought to make bye-laws for the prevention of waste. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Pontypridd Water Company have promoted a Bill to obtain an extension by two years of the period limited by the Pontypridd Water-Works and Tramroad Act, 1908, for making a substantial commencement with the works connected with the construction of the Llia reservoir, and the purchase of lands for the purposes of the reservoir and other works authorized by the Act, except the tramroad and works authorized to be abandoned by the Act of last session. An extension for a period of seven years is, however, required for the completion of the reservoir and ancillary works. Parliament will also be asked to extend for two years, from Aug. 16, 1912, the powers granted to the Company by the Act just named for the compulsory acquisition of lands for the railway and other works thereby authorized, and for their completion. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

The Slough Water Company are applying for an extension of their limits of supply so as to include a portion of the parish of Fulmer, in the county of Buckingham. They wish to have the construction of their existing works confirmed, and require authority to lay pipes along any roads or streets adjoining or contiguous to the limits of supply, for the purpose of conveying water from one portion of the limits to another, and of supplying water within the limits. The Bill contains provisions in regard to the acquisition of lands, springs, and waters, the supply of fittings, the sale of water in bulk, and the application of the Company's capital for the purposes of the intended Act. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Southend Water Company are desirous of obtaining authority to extend their limits of supply so as to include the parish of Buttsbury, in the rural district of Chelmsford; but the provision in the Company's Act of 1879 as to the supply of part of premises is not to extend to that parish. Confirmation is sought for the construction of the existing works, and power to make others, consisting of fourteen pumping-stations, to be completed in fifteen years, is applied for. In addition to the lands which are now in the possession of the Company, or which they have the right to purchase, authority is required for the acquisition of others in the parishes of Downham and Wickford. Further capital not exceeding £200,000 is applied for, the dividend on which—whether issued as ordinary or preference—is limited to 5 per cent. The new capital is, of course, to be sold by auction or tender. Power to borrow to the extent of one-third of the additional capital is required, as well as to create debenture stock, also to be sold by auction. Other provisions in the Bill relate to the supply of water in bulk, the making of agreements with adjacent authorities, the sale or letting on hire of meters, &c. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Bill of the South Hants Water Company is to obtain confirmation of the construction of the existing works, and authority to make others and extend the limits of supply. The new works consist of two covered service reservoirs, one in the parish of West End, and the other in the parish of Hedge End, both in the rural district of South Stoneham, and five aqueducts or pipe-lines in connection therewith; and a period of seven years is required for their completion. The proposed extension of limits will, if sanctioned, bring portions of the parishes of Owslebury, Upham, and Minstead, in the rural districts of Winchester, Droxford, and New Forest respectively, within the Company's area. Permission is asked to raise additional capital not exceeding in the whole £120,000, in £10 shares, to be sold by auction or tender, and to be limited to a dividend of 5 per cent. per annum if issued as ordinary capital. Power is required to borrow to the extent of a fourth and to create debenture stock. [*Parliamentary Agents: Messrs. Bircham and Co.*]

The South Lincolnshire Water Bill is to authorize the extension of the limits of supply of the South Lincolnshire Water Company so as to include the parish of Holbeach, in the county of Lincoln. An agreement, dated June 19, 1906, and made between the Bourne Company and Alfred Robert Blanchett, on behalf of the South Lincolnshire Company, is to be annulled; and certain sections of the Company's Act of 1906, giving protection to the Bourne Council and the Bourne Water Company, are to be repealed. Authority is asked to increase the capital to £42,000, in £5 shares; and to have the borrowing powers granted by the Act of 1906 altered in proportion. The additional capital may be raised by ordinary or preference shares or stock; but it is not to bear more than a 6 per cent. preferred interest. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Staffordshire Potteries Water Company's Bill is to enable them to construct additional works, comprising a pumping-station in the parish of Eccleshall and another in the parish of Draycott-in-the-Moors, both in the county of Stafford, a service reservoir in the parish of Swynnerton, in the same county, and six aqueducts

or pipe-lines. Periods of seven and fifteen years are specified for the completion of these works. For those which have already been constructed, confirmation is sought. Additional capital to an amount not exceeding £180,000, to be issued as ordinary or as preference in £10 shares, is applied for. If the former, it is to be entitled to a dividend of 7 per cent. per annum; if the latter, to 6 per cent. Power to borrow to the extent of one-third is required; also to create debenture stock. [*Parliamentary Agents: Messrs. Batten, Proffitt, and Scott.*]

Application is being made for the incorporation of the Thorne and District Water Company, with power to supply water in the parishes of Thorne, Hatfield, Stainforth, and Fishlake, in the West Riding of York, and in the parish of Crowle, in Lincolnshire. The capital is to be £25,000, in £5 shares; and authority is sought to borrow to the extent of one-third, as well as to issue debenture stock. It is proposed to construct a pumping-station and a water-tower, with a conduit connecting them, in the parish of Thorne; also a line of pipes commencing at the water-tower, and ending at a point in the Thorne-Marshland Road. Similar works are to be carried out in the parishes of Hatfield and Crowle; but in these cases the pipe-lines from the water-towers will end at places named in the Bill. Five years are required for the completion of the works. The rates to be charged for water range from a minimum of 8s. 8d. up to 5 per cent. per annum on the rateable value of the premises supplied, with an additional 5s. for each closet beyond the first, and 7s. 6d. for a 50-gallon fixed bath. The charge for water supplied by meter is not to exceed 1s. 6d. per 1000 gallons, with a minimum charge of 10s. per quarter. Other provisions in the Bill are of the usual character. [*Parliamentary Agents: Messrs. Baker and Co.*]

Another Company for which incorporation is sought is the Wells and Fakenham Water Company, who are applying for power to supply water in the urban district of Wells-next-the-Sea, and a number of parishes in the rural district of Walsingham, in the county of Norfolk. The capital is to be £18,000, in £5 shares; and borrowing powers to the amount of one-third are required, as well as authority to issue debenture stock. It is proposed to construct a well, pumping-station, and water-tower, with a line of pipes to connect them, in the parish of Sculthorpe, and also a conduit or pipe-line commencing at the tower and passing through Sculthorpe into the parish of Fakenham, terminating in the road leading from this place to Little Walsingham. These works are to be completed within three years from the passing of the Bill. The rates chargeable for water are to be the same as those in the Thorne Water Bill, with the usual extras for an additional closet and a fixed bath. The charge by meter is not to exceed 2s. per 1000 gallons, with a minimum of 10s. per quarter. The Bill contains the usual provisions in regard to the supply of water in bulk, the framing of bye-laws for the prevention of waste, &c. [*Parliamentary Agents: Messrs. Baker and Co.*]

The gas portion of the Whitland Water and Gas Bill has already been noticed in connection with the other Gas Bills of the session [*ante*, p. 88]. The limits of water supply are specified parishes in the counties of Carmarthen and Pembroke; and the works consist of two wells and intakes, a service-tank, and three conduits or pipe-lines, which are to be completed within five years. The rates are to be the same as those specified in the two Bills last noticed; the charge for water supplied by meter not to exceed 1s. 6d. per 1000 gallons, with a minimum of 10s. per quarter. The other provisions are much as usual. [*Parliamentary Agents: Messrs. Baker and Co.*]

Experimental Lighting in the City of London.

At the meeting of the Court of Common Council last Thursday, Mr. Gunton, the Chairman of the Streets Committee, brought up a report on the reference to the Committee of the 21st of October last, to arrange for further experimental lighting in the City thoroughfares on the lines set out in the report on the recent inspection of various systems of public lighting on the Continent. They submitted an offer from the City of London Electric Lighting Company to make further experiments at a cost of about £525 per annum, and an offer from the Gaslight and Coke Company to carry out similar experiments at a cost of about £360 per annum; and they recommended that the Committee be authorized to arrange for such experiments in suitable thoroughfares. The report was adopted without discussion, and referred to the Committee to arrange accordingly.

Manchester District Institution of Gas Engineers.—The fortieth annual meeting of the Institution will be held in the Grand Hotel, Manchester, next Saturday. We learn from the programme issued by the Hon. Secretary (Mr. W. Whatmough, of Heywood) that the opening proceedings, comprising the passing of the annual report and accounts, the reception of the reports of the Commercial Sections, and the consideration of a proposed alteration of the rules, will be disposed of under the presidency of Mr. J. W. Morrison. At the conclusion of this business, he will induct his successor, Mr. H. Kendrick, of Stretford, who will deliver his Inaugural Address. There will subsequently be a discussion on Mr. Glover's paper in "Vertical Retorts at St. Helens," read at the autumn meeting last year, and given in the "JOURNAL" for Nov. 2 (p. 316), and in the *brochure* issued by Messrs. Glover and West, on "Continuous Carbonization," in connection therewith. At the close of the business "high tea" will be served; and afterwards the President will hold the usual reception.

THE FLOW OF GAS THROUGH PIPES.

By F. S. CRIPPS, Assoc.M.Inst.C.E.

THE contribution by Mr. Chandler to the stock of information on the flow of gas in pipes, is singularly interesting and instructive. It draws attention to a fact of which many engineers have been long cognizant—viz., that Dr. Pole's formula is scarcely applicable to the flow of gas through very small pipes.

In the preface to the explanation of my four diagrams for determining the flow of gas through pipes (published in 1892), the following words occur:—

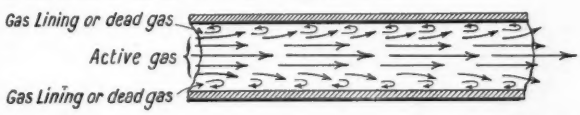
> Barlow's tables—which are simply tabulated results derived from the application of Dr. Pole's well-known formula to several examples—are very limited in range, and are scarcely reliable for pipes of small diameter. With a view, therefore, to correcting inaccuracies, and displaying on a much more comprehensive scale the several problems relating to the passage of gas through pipes, I have prepared the present work and the accompanying diagrams.
>
> The results given by Diagram 1 accord with actual experiments, made expressly for this purpose; and it will be found the results differ greatly from those given by Barlow's tables. The Diagrams Nos. 2, 3, and 4 give results which exactly accord with Dr. Pole's formula.

Unfortunately, I cannot put my hands on the tabulated records of my experiments; but my impression is that the experiments were made with somewhat larger pipes than those given by Mr. Chandler—probably with ¾-inch or 1-inch pipes. For this reason, no doubt, the discharges given for small pipes in my diagrams are greater than Mr. Chandler's experiments seem to justify, although less than would be obtained from Dr. Pole's formula or Barlow's tables.

Again, I may say that my diagrams were more particularly applicable for proportioning mains than services; so that small-diameter pipes occupy but a small space on the diagrams.

It would be a great advantage if Mr. Chandler would extend his experiments to pipes of larger diameter. The skin resistance in small pipes has so much more influence over the passage of gas through them than in the case of large pipes, that it is almost impossible to reason from the one to the other. I do not propose to enter fully into the question; but the following—unscientifically expressed—observations may serve to emphasize this important factor in connection with the problem of flow of gas.

Gas, in passing through a pipe, rubs against the sides or circumference of the pipe, and, as it were, leaves a film of gas behind it—hugging the sides of a pipe, just as we may conceive water wets the inside of a pipe and paints it, as it were, with a film of water. The rougher the interior of a pipe, the thicker is this coat of paint, whether it be water paint or gas paint. The gas passing through the middle part of a pipe slips over this gas lining, somewhat after the manner of the waves on the seashore rolling over the lower strata of water, thus—



In other words, the velocity of the gas at the centre of a pipe is considerably greater than at the circumference of a pipe, as represented by the length of the arrows, due to the friction against the sides of a pipe.

Now it is obvious that in very small pipes the thickness of this coat of dead gas is relatively much greater than in large pipes; and therefore it leaves but the smallest space possible in the centre of the pipe for the active gas to pass through. Hence, after the rate, the quantity of gas which can be passed through a small pipe as compared with a large one, is very much less than might be anticipated.

As to the thickness of the coat of dead gas, there is no doubt it may vary slightly with the size of the pipe; and therefore it is most essential that experiments should be made with larger pipes than those adopted by Mr. Chandler, before basing any empirical formula upon his experiments as applicable to large pipes, and before throwing aside Dr. Pole's formula altogether.,

I suggest that in compiling another formula, the diameter of the pipe should first be reduced by what may be termed the thickness of the coat of dead-gas lining in the pipe. The actual thickness to be allowed for this coat of dead gas to be determined by experiment, as it would vary for different sizes of pipes.

I need scarcely say that when I speak of a coat of "dead gas," I do not mean that it is actually dead and without any movement whatever, but that it moves with so much less velocity that it may, for all practicable purposes, be considered as dead, and in this way allow for the retarding effect on the passage of the main body of gas through the pipe.

It would be a convenience, when experiments are made, if the lengths were given in yards instead of feet, so as to correspond with tables hitherto published.

With respect to the discharge of gas through orifices, the tables I published in January, 1905, give lower discharges than Mr. Chandler's experiments; but it must be noted that my tables apply in that instance to the passage of gas through valves and similar gas apparatus—not simply to thin diaphragms, as in Mr. Chandler's experiments.

DIRECT SULPHATE OF AMMONIA MANUFACTURE.

NOTES OF SOME EXPERIMENTS AND THEORIES.

By G. Stanley Cooper, B.Sc.

The direct manufacture of sulphate of ammonia from ammoniacal or crude coal gas has been the subject of much experimental work and theorizing. Two principal methods are proposed for achieving this end—viz., (1) by simply leading the ammoniacal coal gas into strong sulphuric acid; and (2) by converting the ammonia first into ammonium sulphite and then oxidizing this to ammonium sulphate. It is with the first of these suggested processes that the present paper deals.

Many practical difficulties have been met with in devising processes for this direct manufacture; and the surest evidence that the difficulties have not been yet satisfactorily overcome lies in the fact that the process is at present confined to the experimental stage. Several patents have been taken out claiming to have achieved the direct manufacture of sulphate; but much more improvement will have to be effected before this method can be placed on a satisfactory commercial footing. Many problems have to be faced, and numerous complications arise during the operations.

In the ordinary production of sulphate of ammonia, the reaction is one of simple neutralization of sulphuric acid by ammonia. This reaction is represented by the equation—

$$2\,NH_3 + H_2SO_4 = (NH_4)_2\,SO_4.$$

If the ammonia in crude coal gas was present merely as a constituent of a mixture of gases, it would render the process a straightforward one. Unfortunately, this is not the case; and many subsidiary points thereby arise, which are of especial importance in so much as they make or mar the success of the working.

The chief difficulty met with is the prevention of the deposition of tar in the mixing chamber, and so interfering with the purity of the sulphate. It is desirable, if possible, so to arrange the strength of the acid that the solid sulphate is formed; and hence no evaporation is necessary. This, of course, makes a considerable reduction in the working expenses of a plant. It is found that by simply passing the ammonia mixed with crude gas into concentrated sulphuric acid, more tar is deposited. But strong acid is necessary to bring about the deposition of solid sulphate. If the sulphate was contaminated with tar, recrystallization would be necessary, and no advantage be gained. With weak acid, the deposition of tar is very small; but at the same time no solid sulphate of ammonia is formed, and hence evaporation is necessary. Some process is required to prevent the deposition of the tar; and this can be attacked from two different points of view. In the first case, the tar might be removed before the gas is used for the manufacture; or, as an alternative, conditions might be so attained that the tar is carried on with the remaining gas. Superheating has been suggested to bring about the latter; and one of the patent processes referred to above claims to bring about the former.

There remains, however, another reaction which will have to be taken into consideration in any direct manufacturing process. It is commonly supposed that sulphuretted hydrogen gas has no action on sulphuric acid; but this is not the case. Sulphuretted hydrogen has a distinct action on the acid, with the ultimate production of free sulphur, which is deposited in the containing vessel. Sulphuretted hydrogen is a reducing gas; and as such it acts on the strong acid and forms sulphur dioxide and free sulphur. Then there is a further interaction between the sulphuretted hydrogen and the sulphur dioxide, with production of more sulphur. The reactions which take place are represented by the following equations:—

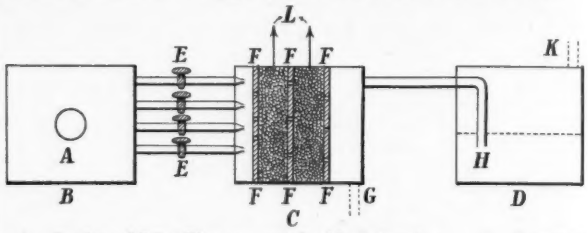
$$(1)\ H_2S + H_2SO_4 = 2\,H_2O + SO_2 + S$$
$$(2)\ 2\,H_2S + SO_2 = 2\,H_2O + S_3$$

Hence if sulphuretted hydrogen be present in any quantity in the gas which is led into the acid, some sulphur will be deposited and the sulphate contaminated. Sulphuretted hydrogen is, to some extent, soluble in water or dilute acid; but it cannot be removed in this way owing to the solubility of the ammonia in water. It would seem desirable, therefore, in any direct process to remove the sulphuretted hydrogen as well as the tar.

The latter substance can be entirely removed from the coal gas by a thorough condensation; but the necessity of having no water present makes this method difficult. What is wanted then is a reliable dry condensation process, without unreasonable enlargement of the apparatus. A method which might eventually meet with some commercial application was suggested to the writer by the following observation. It was necessary on one occasion to test for ammonia the gas near the condenser inlet; and a tube with a fine bore was connected to the tap. The gas, which issued in a fine stream, was directed against a filter-paper; and it was noticed that there was a distinct deposition of tar on the paper—much more so, indeed, than was ordinarily observed. It was decided to attempt to apply this principle of condensation for the removal of tar in connection with experiments already in hand, dealing with the direct manufacture of sulphate of ammonia.

It is a well-known fact that all gases are capable of undergoing great compression. It is also a fact (but one which is far less widely known) that if a highly compressed gas be allowed to expand suddenly, a considerable cooling effect is produced. This, of course, is because the compressed gas, on expanding, performs a large amount of work; and the energy necessary for this work is supplied by the abstraction of heat from the gas itself. By a proper regulation of pressures, it is possible to bring about great cooling of a gas. This cooling would help considerably in the condensation of the surplus tar. The tar is supposed to exist in the gas as minute bubbles; and these must be burst before the tar can be completely condensed and separated from the enclosed gas. By causing the gas at a high pressure to impinge on some sort of screen, the tar bubbles are burst; and the gas passes on while the tar is deposited. At the same time, the sudden decrease in pressure brings about some lowering in the temperature of the gas; and this in itself aids the process of condensation. If the tar is removed in this way, the remaining gas can be led into the acid chamber or saturator, and strong acid can be used without fear of contamination of the resulting solid sulphate.

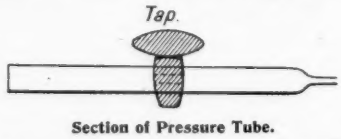
In the writer's experiments, the form of apparatus used is shown in the accompanying sketch. The essential parts are: A fan or exhauster to attain a fairly high pressure; a pressure chamber; a filter chamber for the separation of the tar; and a saturator.



A. Section of Inlet Pipe connected with Rotary Fan. B. Pressure Chamber. C. Tar Extractor. D. Saturator. E. Taps for Regulating Pressure. F. Perforated Screens for Breaking-up and Arresting Tar. G. Tar Outlet. H. Gas Inlet to Acid. K. Gas Outlet to Purifier. L. Packing of Coke, Breeze, and Sand.

[The gas chamber referred to in the article is not shown in the sketch, but would be inserted between the filter chamber and the saturator.]

Sufficient pressure was obtained in this case by the use of a rotary fan; and the gas used was taken before it had passed through the condenser. It was forced into the pressure chamber, which had four outlets that could be regulated at will; and so the changes in pressure were under complete control. A sketch of one of the outlets is shown. It consisted of a glass tube drawn



Section of Pressure Tube.

out at one end to a very fine point, so that the issuing gas passed through an exceptionally small hole. These outlet tubes led into separate long glass tubes of wide bore, which were to act as filter chambers.

The question now arose as to the most suitable packing to use for these chambers. Sand was found to be a good absorbent for the tar; but the possibility of its becoming clogged and so preventing the passage of the gas through it, decided against its use. For a similar reason, coke or coal dust could not be used. It was found, however, that the following arrangement of materials inside the chambers was quite efficacious, and removed all the tar. Immediately opposite the fine opening of the inlet tube, a small screen was erected consisting of lumps of coke packed closely together inside a narrow bag made of sacking, and completely filling the interior of the tube. Two of these screens were placed at each end of the filter tubes; and the intermediate space was packed with pieces of coke, sacking, wood, and waste. The outlet tubes from the filter chambers led into one gas chamber, and from this into the acid chamber; the pipe conveying the gas dipping just below the surface of the acid. The tubes comprising the filter chamber were slightly inclined, and the lower end of each was fitted with a small tube through which the tar deposited could be removed if necessary. The sulphuric acid used in the saturator was of specific gravity 1·82, corresponding to about 90 per cent. by weight of acid.

A quantity of crude coal gas was passed through an apparatus of the form described. The gas was tested for ammonia before entering the pressure chamber and after leaving the saturator. The test was carried out by passing a small quantity of the gas into ammonia-free water, and testing by means of Nessler's solution (an alkaline solution of mercuric iodide). Much ammonia was present in the gas leaving the condenser; but none was found in the gas issuing from the saturator. The gas passed into the pressure chamber was dark in colour, and contained much tar; but the gas which passed into the gas-chamber referred to above was absolutely clear, and no trace of tar was noticed in the sulphuric acid after the gas had been passing through it for two hours. As an extra precaution—to prove the absence of tar—the gas issuing from the saturator was passed through a washer containing water, but no deposition of tar was noticed.

A small quantity of solid sulphate of ammonia was produced,

but not as much as had been expected. This may have been due to the fact that the sulphuric acid was present in too great an excess, and so prevented the deposition of the solid sulphate. The acid became very dark brown, and a quantity of sulphur was deposited. This no doubt was owing to the reduction of the acid by the sulphuretted hydrogen, as indicated above.

It was found that, by using a rather weaker acid, the action of the sulphuretted hydrogen on the acid was considerably lessened; and experiments were carried out with a view to finding the least concentration of acid which could be used to secure the deposition of solid sulphate of ammonia. Very inconsistent results were obtained, and no reliable conclusions were arrived at.

The experiments seem to show, however, that there is some degree of possibility in the direct process, and certainly give an indication as to where the difficulties of the process lie. The incorporation of a workable plant constructed on lines somewhat similar to the apparatus described above would not be a difficult matter on any works. The saturators would, of course, be worked in series, just as the oxide purifiers are worked at present, and would have to be made of lead or some other material unaffected by the acid.

COST OF GAS AND ELECTRIC LIGHTING.

A Practical Demonstration at Chichester.

The energetic Engineer and Manager of the Chichester Gas Company, Mr. T. Ebenezer Pye, is affording the residents an excellent opportunity of comparing the relative costs of gas and electric lighting, without putting them to the trouble of studying a number of figures bearing upon the subject. He has had fitted in the window of the Company's show-rooms two lights—gas on the left and electric on the right—so that they may be easily compared. A comparison is also provided in a darkened room within, to which visitors are invited. The whole of the electric lighting was fitted up by a firm in the city, who were instructed to so arrange as to give their light the most favourable opportunities in the demonstration. The two lights are assumed to be of about the same illuminating power, and are of the most efficient types yet introduced. They are so controlled that both must be turned on and off together; and therefore each is in operation exactly the same number of hours. They are connected to special meters, which register the quantity of gas and electricity consumed. It was the intention of the Gas Company to have both meters in the window, under the observation of the public; and the gas-meter has been so fixed. The Electricity Company, however, refused to fix theirs in the window, but put it in the cellar of the premises, where it may be seen, and its records ascertained, by all those desiring to do so.

The date of commencing the test was Dec. 14, 1909; the gas-meter being then at zero and the index of the electricity meter standing at 39·32. Up to the 7th of January the records were as follows:—

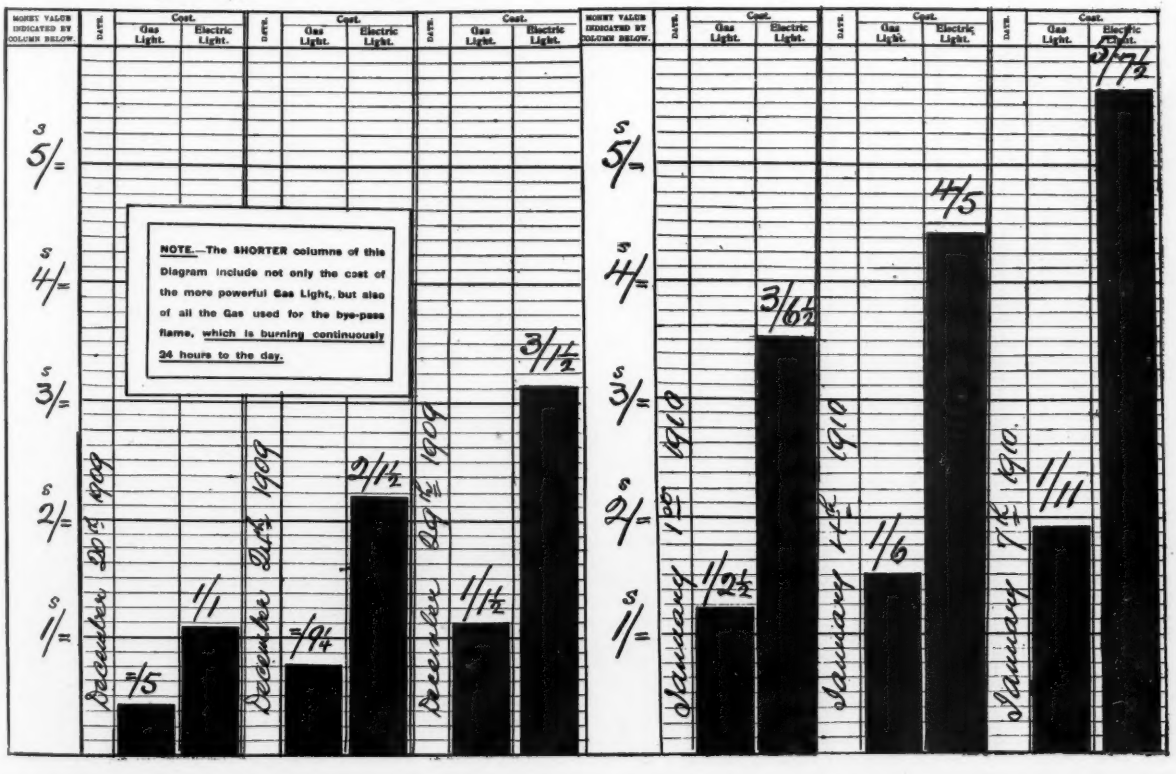
Gas used (including bye-pass flame), 545 cubic feet, costing 1s. 11d.
Electricity used, 11·27 units, costing . . . . . 5s. 7½d.

Difference in favour of gas . . . . . 3s. 8½d.

The foregoing particulars are printed in bold type on a large sheet hanging in the window; and accompanying it is a diagram, of which we give a reproduction, showing at a glance the great difference in the cost of the two lights. The demonstration has not only proved attractive, but has had beneficial results in several ways. Mr. Pye is to be congratulated on the happy thought which led him to give his fellow-citizens this effective object-lesson in economic *versus* extravagant lighting.

HOW TO ADD TO THE COST OF ARTIFICIAL LIGHTING.

The Diagram below shows **the actual progressive costs** of the Gas and Electrical Lights exhibited in comparison in this Window and inside the Show Room. The actual cost of each light is ascertained by reading the Index of the Gas Meter, and that of the Electricity Meter, respectively, on the dates stated.



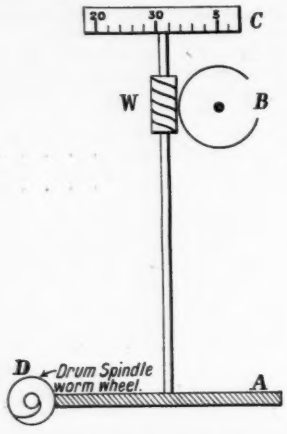
Wholesale Fittings Company's Anti-Vibration Light.

Attention is drawn by the Wholesale Fittings Company, of No. 30, Commercial Street, E., to an inverted anti-vibration gas-fitting for use in factories, workshops, warehouses, printers' machine shops, weaving sheds, and other places where such appliances are required. In this arrangement, everything tending to complexity is avoided; simplicity and cheapness being the points aimed at in its design. The fitting complete (which is claimed to furnish, with a minimum gas consumption, about 120-candle power downward light) consists of a brass rod, with stopcock and chains, and a spring and flexible tube anti-vibrator so fitted that all shock or jar is absorbed before it can possibly reach the mantle. There is also provided a highly-enamelled protector; and a best hard-glass bulb attached to an "Ezol" reflector burner.

THE TESTING OF METER-GEARING.

By R. G. Marsh, of Birmingham.

I am enclosing a formula that I have worked out for application to the gear-mechanism of wet meters; its use being to enable one to quickly and easily work out what should be the proper number of teeth on each of the various gear-wheels in the train of the gear-mechanism, so that the meter shall register accurately with a given drum-capacity. It is applicable to any wet meter with a vertical spindle; and it is easily adaptable for dry meters. In the case of cylinder wet meters, the gear is so simple that a formula is hardly necessary.



Let a = number of teeth on A
b = „ „ B
c = „ cubic feet round C
d = capacity of drum D.

In the case of a single worm on the drum-spindle
$d\,a = c$; because D has to revolve "a" times for one revolution of C.

In the case of a double worm on the drum-spindle
$d\,\frac{a}{2} = c$; because D has to revolve half "a" times for one revolution of C.

1 revolution of C $= \frac{1}{b}$ revs. of B (single worm at W)

1 „ „ C $= \frac{2}{b}$ „ „ (double „ „)

But 1 rev. of B = 1000 c. ft. (in all sizes above five-light)

Therefore, 1 rev. of C $= \frac{(1 \text{ or } 2) \times 1000}{b}$ c. ft.

Rules from the Above.

I. Single worms top and bottom $d\,a = \frac{1000}{b} = c$

II. Double worms top and bottom $d\,\frac{a}{2} = \frac{2000}{b} = c$

III. Single worm top, double bottom $d\,\frac{a}{2} = \frac{1000}{b} = c$

IV. Double worm top, single bottom $d\,a = \frac{2000}{b} = c$

Example 1.—What should be the number of teeth on A when $d = \frac{1}{3}$ $b = 50$? Single worms top and bottom.

From formula I. $d\,a\,b = 1000$

$$a = \frac{1000}{d\,b}$$

$$= \frac{1000}{\frac{1}{3} \times 50}$$

$$= 60 \text{ teeth.}$$

Further, what should c be?

From formula I. $b\,c = 1000$

$$c = \frac{1000}{b}$$

$$= \frac{1000}{50}$$

$$= 20 \text{ teeth.}$$

Example 2.—In a 100-light meter with a single worm at the bottom and a double worm at the top, and a drum capacity of 5 cubic feet per revolution, what should be the number of teeth on B when there are 20 teeth on A?

From formula IV. $d\,a\,b = 2000$

$$b = \frac{2000}{20 \times 5}$$

$$= 20 \text{ teeth.}$$

Further, is C correct at 100 when there are 20 teeth on A?

From formula IV. $d\,a = c$

$5 \times 20 = 100$

C is therefore correct.

In 3-light and 5-light meters, instead of the cog-wheel B being on the same spindle as the first index-finger, there is generally an intermediate spindle. There is a small gear-wheel on the spindle of B, which engages with a larger gear-wheel on the spindle which carries the first index-finger. In this case, it is only necessary to alter the formula by multiplying the factor 1000 by the ratio of these two gear-wheels to each other.

To give an example: In a 5-light meter with a drum capacity of 0·25 cubic foot with single worms top and bottom, what should be the number of teeth on A when B has 30 teeth engaging in the worm W with a wheel of 6 teeth on the spindle of B engaging with a wheel of 20 teeth on the first index-finger spindle?

From formula I. $d\,a\,b = \frac{1000 \times 6}{20}$

$$a = \frac{6000}{20 \times 0{\cdot}25 \times 30} = 40 \text{ teeth.}$$

It is interesting to note that in 30-light and 60-light meters with a single worm and 33 tooth wheels at A, the drum capacity is not exactly 1·5 and 3·0 cubic feet respectively, as is printed on the index; but 1·51 and 3·03. Since a whole number is a necessity, 33 is the most convenient to use. For the meters to be accurate with drum capacities of exactly 1·5 and 3 cubic feet respectively, there would have to be 100 teeth on the wheel A and a triple worm on the drum-spindle.

THE EXPLOSION AT COATBRIDGE GAS-WORKS.

The Wrecked Purifier-Shed.

In the last number of the "Journal" (p. 451), we reported the occurrence of a serious explosion in the purifier-shed at the Coatbridge Gas-Works on the evening of the 10th inst. We are now in a position to give some additional particulars in regard to the disaster, the effects of which will be apparent from the accompanying reproduction of a photograph taken by Mr. Thomas Wilson, the Engineer and Manager of the Gas Company.

The purifiers, four in number, were set on six walls, 2 ft. 6 in. high. Gas had doubtless accumulated under the floor of the purifier-shed, and had ignited at some light near, with the result that the four boxes, being raised in a body and falling back on the walls, were so smashed that not a whole plate remained. The floor, which was made of 3-inch pitch pine, was shattered into

atoms; and the shed, which was 130 feet long, 20 feet high, and 30 feet broad, was entirely wrecked—the woodwork being thrown to considerable distances. The roof of the shed was composed of T-rafters and angle purlins, supported by ten strong cast-iron pillars and beams; and the whole was twisted into a complete mesh and became a total wreck. Some large pieces of iron were projected to a great height, and falling on the crown of two of the gasholders caused large perforations.

A large amount of damage has been done to adjoining buildings, both inside the gas-works and for some distance outside; the windows in the neighbourhood being shattered. The North British Railway Company's workshops, which adjoin the gas-works, suffered considerable damage to the roofs and the telegraph system. The report of the explosion was heard for a distance of six miles. The local Fire Brigade turned out, but it was of little avail, as it was only the gas burning from the inlet and outlet connections that caused the fire; and when the valves were closed this was extinguished. The night foreman had occasion to be in the neighbourhood of the shed at the time of the accident, and he was found 20 minutes later among the *débris*, severely injured. His life was at first despaired of, and he was removed to the hospital; but we learn that he is making progress towards recovery.

Mr. Wilson is of opinion that the cause of the explosion was a sudden outburst of gas due to a plate or some of the connections giving way through a subsidence of the ground; the minerals in the whole of the district having been worked out. Seeing that the purifiers were a total wreck, Mr. Wilson was for a time at a loss as to what to do to keep the supply of gas going; but he resolved to utilize two old tower scrubbers, and for the time being clean the gas with milk of lime. It was further arranged to erect two temporary wooden boxes, 20 feet square, for the purpose of purifying the gas until permanent purifier boxes could be provided. Mr. Alex. Wilson, the Chief Engineer of the Glasgow Corporation Gas Department, on learning of the catastrophe, motored out in the early hours of the morning for the purpose of rendering assistance.

ILLUMINATION.

A course of lectures is being delivered by Professor Silvanus P. Thompson, D.Sc., F.R.S., at the Royal Institution, on the subject of "Illumination, Natural and Artificial." The first of the series was delivered on Thursday last. The prefatory remarks conveyed to the audience the largeness of the subject, seeing that it referred to the lighting of private residences, streets, shops, schools, churches, theatres, and numerous other places, all of which required different forms of treatment in regard to illumination. The subject had occupied a great deal of attention of recent years. Gas engineers, electric engineers, people who dealt in acetylene, oil, and miscellaneous forms of lighting, had been much exercised over the question, because they realized how extremely imperfect were the methods of utilizing the sources of light evolved by the progress of science. So much was this the case, that special societies had been formed in the United States and in this country in which the rival interests of gas, electricity, and acetylene were for the moment happily merged, and the rivalry laid aside in the combined study of problems of illumination, with the object of bringing to practical issue questions agitating those concerned. In this first lecture, he had to deal with preliminaries which would necessarily come into consideration in more detail in the next two lectures. First of all, they had to consider that which was the source of illumination —viz., light. It was necessary to distinguish between the two things—light as the cause, illumination as the effect. The sources of light would be of no use to us unless they produced illumination. The study of light and light sources was a very old one. Optics went back many centuries; but in only comparatively recent times had there been any precise or quantitative study of the amounts and values of different sources of light.

They had to think of the quantities of light produced by illuminants, and also of the quality of those lights. Quantity could not be dealt with accurately without deciding the terms. Therefore it was necessary to speak of the quantity of light in terms of some definite unit, and then say how many times the subject under consideration was worth in terms of that unit of quantity. They wanted to be able to say in the first instance how much light was being given by different sources, how bright they were, and what was their actual quantity in luminosity. The unit in which the brightness of light was described was the candle. The sperm candle was dealt with; and then it was explained that the difficulties of producing an absolute standard were so great that the standard candle had been abandoned. They had now another unit which was described in terms of the candle—that was, the Harcourt 10-candle pentane lamp; and it was much more satisfactory than the standard candle. With it, as with the candle, care had to be taken in reference to the moisture, &c., of the air. The units of Germany and France were explained; and then it was mentioned that we had practically arrived at an international agreement regarding the definition of 1 candle. But the unit of light was not a physical quantity in the same sense as other physical units with which physicists work. It was a physiological standard. Candle power could not be defined in terms of a watt, or any other physical unit. The eye was the ultimate judge; but the eye is an imperfect instrument. It could not form an absolute judgment about a light. Entering a lighted room, no photometrist could tell with any degree of accuracy the candle power within 20 per cent. of the truth. The eye made its judgments biassed by all immediate impressions. The eye could not draw quantitative judgments itself under standard conditions. What it could do under given conditions was to estimate equality. If there were two lights under equal conditions where they could be compared, the eye could pronounce upon equality, but could not give quantitative judgment. The eye could not draw quantitative judgment of 2 to 1 or 3 to 1; but it could judge the equality of 1 to 1, 2 to 2, or 10 to 10. The eye was therefore that which came in to judge of these matters. The lecturer then traced the development of photometers in which the eye was brought in as the judge of equality; and incidentally in this connection he stated, when speaking of the grease-spot disc, that personally he preferred the paraffin wax block. Passing on, illumination photometers for measuring the light falling on surfaces were described.

Coming to the question of the quality of light, he said this was a matter to be seriously considered. They were told that white light consisted of a large number of coloured lights combined together. This was learnt from the text-books. They had to some extent to unlearn this. White light was not strictly speaking a combination of several colours; it was a complex unity. And its sorting out had been undertaken by Abney. When white light was seen through a prism, a spectrum was obtained; and the white light could be analyzed into its various constituents, which were different one from another. Some figures of Abney's were given by the lecturer to impart an idea as to the qualities of light:—

	Red.	Green.	Blue Violet.
Sun light	19	37	44
Sky light	9	23	68
Arc light	22	36	42
Gas flame (batswing)	45	43	12

GLARE: ITS CAUSES AND EFFECTS.

Illumination a Matter of Individual Requirement—The Necessity for Screening Metallic Filament Lamps.

Discussion of this subject was continued at the Meeting of the Illuminating Engineering Society, at the Royal Society of Arts, last Tuesday—the PRESIDENT (Professor Silvanus Thompson) in the chair. It will be remembered that the debate was opened by a paper by Dr. J. Herbert Parsons, F.R.C.S., at a meeting held on Jan. 11 (*ante*, pp. 147, 167, 344). On this occasion, there were only, at the outside, three dozen members present.

The PRESIDENT remarked that, at the January meeting, the subject was mainly considered from the physiological side, but on this occasion they were dealing with the more practical application of these matters. Mr. Trotter would open the discussion.

Mr. A. P. TROTTER, Electrical Adviser to the Board of Trade, said he understood the discussion was to be mainly practical; but, with the permission of the President, he would like for a moment to be, he would not say theoretical, but physiological, since at the last meeting a problem was set for their consideration. It was whether the contraction of the iris which causes a reduction of the area of the pupil was due to the light entering the pupil, or whether it was due to light falling upon the cornea or, also, upon the iris. He was interested in the question of the contraction of the iris some 30 or 40 years ago; and he then used a very simple instrument for at all events forming a good idea of the contraction of the iris. He found that, with a 16-candle lamp, at about ¾ metre away, causing a contraction of the pupil of more than 25 per cent. in diameter, when the pupil alone was isolated from the light, and when the light fell upon the cornea and more or less on the iris, there was no perceptible relaxation of the pupil, when the pupil was screened. It appeared to him that the contraction was always due to the light falling on the cornea and the iris; and it might be 5 per cent., but he did not think it was 10 per cent. Screening the lamp and unscreening the lamp, he saw no difference in the size of the retina. They had had a good many questions put before them for consideration in connection with this subject. The first was: "What exactly constitutes a 'glaring' system of illumination?" The word "exactly" was a very troublesome one indeed. Dr. Hyde had given one of the best answers. It was illumination that was painful or uncomfortable; but so many different people had different ideas as to what was discomfort. Another question was: "Is it desirable to recommend that sources of a brilliancy higher than a certain limiting value should never be used unscreened in interiors? Or that such sources should be placed a certain minimum distance from the ground?" This brought them to the question of intrinsic brilliance, which came in with other of the questions. For instance, "What instruments are available for measuring in a simple manner the intrinsic brilliancy of any luminous object? And what accuracy may be expected in such measurements?" As he understood intrinsic brilliance, it was simply the relation of the candle power of the source of light to the area—the effective area—of that source of light. The ordinary candle flame measured about 2 inches high, and about 0·4 inch at the base. The candle power was (say) 2·5 per square inch. Some years ago in a paper, he put it down at 2-candles per square inch;

but he had that evening measured it up again with an old parliamentary standard candle giving rather a smaller flame, and he found it came to the candle power per square inch that he had mentioned. It seemed to him that the candle was a very good standard for ordinary interior work for the maximum and minimum intrinsic brilliance which should be ordinarily permitted. When they came to more than that for lights that were close by, the intrinsic brilliance began to get rather painful. On the other hand, the question of distance somewhat complicated matters. Where they had powerful lights at a considerable distance, subtending at small angles, then other considerations came in. In regard to this question of intrinsic brilliance, he thought it was a serious mistake to calculate the intrinsic brilliance of a filament lamp by taking the length of the filament, and its diameter, and, multiplying the length by the diameter, say that was the number of square inches of the filament; and then to take the candle power per square inch, and say that was the intrinsic brilliance. That was altogether wrong, for the question of irradiation came in very largely. It was all very well to measure the filament of a glow lamp, and say it was 0·2 mm. Nobody ever saw a glowing glow lamp with a filament of that width; it appeared to be fully ten times that width. If it appeared to be so, then, for ordinary practical purposes in considering this matter, it was so. One could not go into the question of irradiation here; it might be merely an optical phenomenon. Very largely it was a functional matter that physiologists might explain. Whether it was partly subjective, he did not know. For all practical purposes, a bright filament looked at pretty closely was 4 or 5 inches in diameter. Therefore the intrinsic brilliance would be about one-tenth of what it would be if they took the diameter of the filament as usually measured. Looking at an open lamp, one could not see the filament, but one mass; and in his opinion, they should take the number of square inches over the whole, and not merely of the filament itself. Turning to still more practical questions. There were two broad methods of lighting—one in which the source of light was within the range of vision, and the other in which it was practically outside it. For domestic lighting, the lamps had to be, for the most part, within the range of vision. There was, however, a charming but expensive way of lighting a room by cornice and ceiling lights, and for all practical purposes the lamps were not in the range of vision. Under these circumstances, it was convenient and desirable that the intrinsic brilliance should not exceed about 1 candle per square inch or thereabouts. In 1880, electric lighting was beginning; and they had Swan lamps and Edison lamps. And it seemed to him then that they would soon get lamps so brilliant that they would be unbearable to look at. It had taken thirty years, and they were still about the same brilliance as they were. They had now, however, metallic filament lamps; and he thought something would have to be done to reduce the brilliance. Thirty years ago he designed a globe with a prismatic surface for shading the lights. [One was exhibited.] It was at least fifteen years too soon; and it had been re-invented by others, and improved by the Holophane Company. It was intended to spread the light; and putting one over a 16-candle power lamp gave about 7½ square inches, and this gave about 4½ candle power per square inch, which was rather too bright; and he must confess he did not use it in his own house. When the light was within the range of vision, it was either desirable to reduce the intrinsic brilliance or to get rid of it altogether. For some years past he had had a holophane lamp over the desk in his office at about 4 feet from the table, and it gave a very nice light concentrated upon the book or papers or whatever work he was engaged upon. But he found his sight was beginning to fail a little; and he wanted more light. It was an easy thing to pull a lamp down, but then one got the light in front of one's eyes. He had therefore come back to a dark green, deep shade, hanging just below the level of his eyes; and he enjoyed this lighting very much. The reflected light was quite enough for the rest of the room for ordinary purposes. He personally found this was an extremely agreeable kind of light; but Dr. Louis Bell, who was an acknowledged authority on the subject, said it was most objectionable. It was such a large subject that it was extremely difficult for anyone to lay down rules; and it seemed to him that each person must look after himself. Well now, as he had said, there were two sources of light—one within the range of vision, and one outside. Where the light was within the range of vision, as in ordinary domestic lighting, he used a shade made of the paper such as jam-pots were covered with. Lights, when so placed and screened, up against a whitewashed wall gave a tremendous amount of illumination.

Mr. H. Agar Baugh (London) remarked that reflection from the ceiling gave ideal illumination; but it was expensive for ordinary rooms. It was, in fact, very expensive. He had therefore made some experiments with obscured glass covers for incandescent gas lighting and metallic filament lamps, and found the light much better than without them. Pointing to a rough surfaced frosted globe, he described it as being much better than an opal one. In his case metallic filaments were positively painful. If he looked at one he had, on turning away, the image of the filament in his eyes. Some people, of course, could look at an arc lamp and not feel any inconvenience; but that was not so in his own case. After making experiments in diffusing light, he used a shade well covering the lamp—a perfectly opaque shade being better than any kind of opal or transparent shade. It was very restful to the eye, and very economical in use. With such a shade, a bijou inverted incandescent gas-lamp, using only 1 cubic foot of gas an hour, gave a good light, as did also a 16-candle metallic filament lamp. With either, one got an ideal light on the table; and he did not think it possible at any price to get a better light on a table, even by reflection from a ceiling. Gas had one advantage over the electric light. It could be turned up or down, and so could be adjusted at will. If he was in good health, he could do with 1 cubic foot of gas; if he was tired, he wanted a little more. In private houses the problem was very different. Then for decorative effect, there was nothing to touch imitation candles, with shades such as Mr. Trotter described.

Mr. J. S. Dow summarized some communications received from foreign members. One was from M. Blondel, of Paris, in which he stated that he became interested in the subject of glare many years ago, and had engaged in developing shades and the holophane type of glassware, to reduce it. Professor A. Grau, of Vienna, took up the question as to how far it was possible to do what theoretically ought to be done—to specify a limit for the intrinsic brilliancy used in an interior. He thought it impossible to lay down any rigid specification; all one could do was to try to keep naked lights high up, or, if very powerful illumination was required, it should be rather by a large number of small units, than by only a few powerful ones. Then the Engineer of Messrs. Körting and Mathieson, of Berlin, laid stress on the desirability of reproducing in artificial illumination the best daylight conditions. Yet they must not always try to imitate daylight, because, when weather conditions were bad, daylight could be injurious. One object of artificial illumination should be to keep it out of the range of sight wherever they could manage to do so. Then it was also thought that we ought to try to get the light from an illuminated surface, instead of from the source itself, especially if it were an intense one. There was agreement that it was impossible to give any answer to the question as to the maximum and minimum intrinsic brilliancy, though one could come near to it in small interiors. Dr. K. Stockhausen advised the collection of evidence as to the effect of different illuminants on the eyesight. By circularizing them, data might be collected from the Ophthalmic hospitals, schools, and foreign countries. He thought that in an interior one ought to try, if possible, to see that no source of illumination was used that had an intrinsic brilliancy of more than 0·5 Hefner unit per square centimetre. The Doctor also seemed inclined to suggest that the present system of lighting streets was wrong in principle, and that sacrifices ought to be made even to get down the intrinsic brilliance—that it might be better to lose light in order to get a glow round the source; so that as one went by a light one did not get the dazzling effect which one was bound to find in the streets of London. Finally, he laid stress on the need of some sort of Committee to secure definite information.

Mr. Cooper disagreed with most of the definitions of glare that had been given. Generally speaking, he did not think that glare depended upon brilliancy. Taking the metallic filament lamp, at night one found it a distinctly unpleasant thing to look at; but in daylight it was not at all unpleasant. If a lamp was placed against a black wall, there would be the sensation of glare; if placed against a whitewashed wall, glare would not be found so much. With a whitewashed wall, there was greater intensity of illumination; but with a black wall there was greater contrast and glare. When one was reading by daylight, and one switched on a light to one side, then one ceased to go on reading with any comfort. Consequently, he thought that glare must be defined as a contrast, which was due to the eye trying to adapt itself to a high illumination on the one hand and to a low illumination on the other. He thought that possibly the contraction of the pupil in passing from the lower to the higher illumination might be used as a measure of glare. There seemed a great tendency at the present time to use metallic filament lamps unshaded, which was a great mistake. The intrinsic brilliancy of these lamps was certainly much higher than that of carbon filament lamps; and their use, without being properly shaded, was extremely bad. One constantly saw cases of this kind. In the Reading-room of the Patent Office, lamps were fixed on the tables by which to read, but the lamps were put in so that they were below the edge of the shades. If one sat down to read, one had a bright field of brilliancy within view. That had since been remedied. He also quoted a recent example of bad shop window lighting, and concluded by saying that he thought the Society would do good work if, in respect of the lighting of public buildings, they brought pressure to bear upon the authorities concerned.

Mr. W. M. Mordey (London) asked whether the Society had considered the question of the relative ability to see, as distinct from relative illumination. The question should be taken up as to how well one could see in rooms differently lighted. Take a room that struck one as being dark—a room lighted by reflected and uniform illumination. A room such as this, which struck one as being dark on going into it, when one sat down in it, gave one a feeling of restfulness, and enabled one to work in comfort. Then going into a room brilliantly lighted, one soon, if working, had a feeling of restlessness. What one wanted to arrive at was comfortable seeing rather than the amount of light. Mr. Trotter said that, for all practical purposes, exposed lamps were necessary for domestic lighting. He (Mr. Mordey) would like to question this. He could not help thinking they were going rapidly in the direction of abandoning exposed lights altogether. If one could have a room lighted without glare, with a sort of luminous paint laid evenly on the walls, that would be an ideal sort of lighting. With bright lights, such as those illuminating the hall in which they were assembled [metallic filaments], one could not rest one's

eyes. The whip-lash of these bright lights irritated one's nerves. Reflected light would give them a better result; and they would see equally well with much less light. In the new theatre of the Institution of Electrical Engineers, they had come to the conclusion that they must, at all costs, avoid this terrible whip-lash of exposed lights such as they had before them at the Society of Arts rooms, at the Institution of Civil Engineers, and in nearly every other place of meeting in London. He did not suppose the makers of lighting fittings would welcome the change; but he thought there would be a field for them in developing the lighting of buildings, by putting to better use the brilliant lights that now existed, in the sense of having comfortable seeing rather than brilliant illumination.

Mr. HAYDN T. HARRISON (London) said, after all they had heard and read, he did not think anybody had quite defined what glare was. If they added up the various definitions, they would, in his opinion, find the true definition. First of all intrinsic brilliancy did enter into the question; and intrinsic brilliancy would always be found by the area of the source of illumination. Then the contrast question came in, which they should also be able to put into an equation. If the adjacent surroundings of a source of light were illuminated up to the same degree as the source of light itself, the contrast would be unity, and there would be no glare. Therefore it was a question of intrinsic brilliancy and contrast. If the factor of candle power were divided by the degree of the illumination of the surrounding objects, he thought that would give them some useful information. The definition of glare was, of course, difficult to get at; but he thought it could be put into a formula which would be very useful. If they took a white screen and a black screen, the effect of glare in front of the former was practically negligible, but in front of the black screen it was very great. The reason the metallic filament lights in the meeting hall gave them the effect of glare was because there was a dark surface above; if there were a white surface above, there would not be the effect of glare. There was another point that came up in connection with this question of glare. Everybody seemed to think if he could eliminate the source of light altogether, and get indirect illumination, he would arrive at a sort of millennium of lighting. Personally he did not like a shadowless room; nothing was more pleasant to sit in than a shadowed room. He did not say the source of light should be definite or visible; but it ought to throw some shadows. Without, a room would be rather depressing.

Mr. LEON GASTER remarked that intrinsic brilliancy of lamps had very much to do with the whole question of glare; and from offices, banks, and so on, they had plenty of complaints of this. But by putting the lamps at a proper angle and in proper position, the complaints could be remedied. They wished to impress upon the users of lamps that they should keep the light away from the angle of vision, and that there should be care that the intrinsic brilliancy was not beyond a certain minimum. This, of course, led up to the question of who should decide the minimum. With regard to Dr. Stockhausen's proposal, Mr. Gaster put before the members a resolution by the Council to the effect that an International Committee be appointed by the Illuminating Engineering Society to consider the question of glare from modern illuminants, and to collect evidence as to its causes and effects. In the course of further remarks, he said he thought the question of glare ought to be carefully considered. In the City, the police authorities had recommended that high-power lamps suspended in front of shops should be screened on the side of the traffic. This was right.

There were two or three other speakers, and then the PRESIDENT ran lightly over points raised in the discussion; among them being that Mr. Trotter, Mr. Cooper, and Mr. Haydn Harrison had emphasized the necessity in considering the question of glare of not only taking into account intrinsic brilliancy but contrast as well. Concerning Dr. Stockhausen's proposal, it ought to bear fruit. As to the Council's resolution, he hoped they would be encouraged to take action in this matter, because no doubt a great deal of useful information could be arrived at by collecting data.

Sexton on Fuel and Refractory Materials.—We have received from Messrs. Blackie and Son, Limited, of Old Bailey, E.C., the second edition of "Fuel and Refractory Materials," by A. Humboldt Sexton, F.I.C., F.C.S., Emeritus Professor of Metallurgy in the Glasgow and West of Scotland Technical College. The author has not found it necessary to make any alteration in the scope or general arrangement of his book; but since the first edition was published, changes and developments have occurred in connection with coke-ovens, gas-producers, and pyrometry. Considerable additions have therefore been made in the chapters dealing with these subjects. The book will be more fully noticed in a later issue.

Visit of Mr. P. C. Holmes Hunt to England.—It will be seen, from the report of the concluding proceedings at the fourth annual meeting of the Victorian Gas Managers' Association, noticed elsewhere, that Mr. P. C. Holmes Hunt, the Engineer of the Melbourne Metropolitan Gas Company, who has been re-elected President for the current year, will pay a professional visit to England in the course of the summer, and will probably cross the Channel to see what is being done in Berlin and elsewhere in connection with vertical retorts. Though, on his return to Melbourne, he will necessarily be busy preparing reports for his Directors, his next Presidential Address may nevertheless be expected to contain matter of special interest to members of the Association.

VICTORIAN GAS MANAGERS' ASSOCIATION.

Fourth Annual Meeting.

In the last number of the "JOURNAL," we gave a report of the opening proceedings at the fourth annual meeting of the above-named Association, held in Melbourne on Nov. 3 and 4, 1909, together with the address of the President—Mr. P. C. Holmes Hunt, the Engineer of the Melbourne Metropolitan Gas Company. Elsewhere in the present issue (see pp. 508-13) will be found the papers read, with some notes of the remarks made thereon; and below we give the questions discussed by the members, and a report of the concluding proceedings at the meeting.

THE "QUESTION BOX."

I.

"Is there any benefit to be derived from the use of Maitland coal as compared with Newcastle coal?"

Mr. S. E. FIGGIS (Ballarat) said he supposed there was nothing connected with the gas industry that was of so much interest to those engaged in it as the coals they had to use. For the past forty years they had in Ballarat obtained their supplies from Newcastle; and excellently well they had been served. It was unfortunate, however, that many of the best pits were almost worked out. But, Providence had been good enough to permit man to open up a fresh coal district at Maitland; and Pelaw Main, Abermain, Stanford Merthyr, Aberdare, and Hebburn were all very good mines. He had had the pleasure of using, though not on a very large scale, some of these coals. The first he received was Stanford Merthyr; and he did not think he had ever handled a better gas coal. Certainly the coke from it, as indeed from all Maitland coals, was in some respects not so good as from the Newcastle; but they made a good gas coke, and one could get as great a yield of tar as from Newcastle coals. He had also tried Aberdare, Hebburn, and Pelaw Main coals; and they were all good for gas-making purposes. He would ask members to give their opinions as to these coals, and also as to the future of the coal supply. On the question of yield, he was in an excellent position to test it. He recently received a cargo of one of the Maitland coals, and kept it by itself. He took the meter at a certain hour in the day, and they ran the coal (some hundreds of tons) to within half-a-ton of the cargo, and the result was a make per ton of 12,500 cubic feet of 16 to 17 candle gas. So far as the coke was concerned, his experience was that it was excellent; and in the fires it was immeasurably superior to the Newcastle coke, though it was true they would not get the same quantity per ton.

Mr. T. LORD (Geelong) said about three months previously he made an effort to give Maitland coal a thorough practical test; and he came to the conclusion that if this coal would not yield what he termed a proper coke for supplying their best customers, though it might be well to use it for gas, it would be better to mix it with another kind for the production of residuals.

Mr. W. PAIN (Bendigo) said they had been in the habit of using Maitland coal since 1904, and he must acknowledge that, providing he got a good sample of Abermain coal, he would not ask for anything better. It was a first-class coal for burning off, free from naphthalene, and good for the production of tar. Originally, when he used Newcastle coals, he found that under the intense heat there were chokes; but since using the Abermain coal there had been no stoppage of this kind. The yield of gas was 11,300 cubic feet per ton.

The PRESIDENT (Mr. P. C. Holmes Hunt) asked Mr. Pain if he thought the Maitland coal was all round decidedly better than that from Newcastle.

Mr. PAIN said he did, for general work; but it did not yield a household coke.

Mr. S. MARSH (Mentone) said that up to eight months previously he had been using nothing but small Newcastle coal. Then their coal contractor refused to supply them with this coal any longer, but said he would send Maitland instead. They were quite agreeable; and after using it, their customers asked them where they got such good coke from. The yield of gas per ton was 12,700 cubic feet from the Maitland, as compared with 11,500 cubic feet from the Newcastle coal. He had no trouble with the clinkering.

Mr. T. GALE (Footscray) said they had used a lot of Abermain coal—in fact, nothing else for the last four or five years. The coke produced was very good, and they got about 11,000 cubic feet of gas per ton. The tar also was really good.

Mr. KEMPSTER (Waratah, N.S.W.) gave the members some information about the Maitland coals, as his works were situated near the mines, and he had been using the coals for some time. For about fourteen years, when the Hetton coal was really at its best, he was getting from it an average of 9000 cubic feet of 16-candle gas to the ton. All at once however, this coal fell off; and he had to go to Maitland. With Abermain unscreened coal, he obtained a return of a little more than 10,000 cubic feet—sometimes it averaged 10,200 cubic feet—of gas to the ton, while the illuminating power was very good. The coke had a good sale; and the people were very pleased with the tar, though the yield of this residual was not quite so large as from the Hetton coal. Unless he could get a coal something like the Hetton was a few

years ago, he would not care to give up the Maitland and go back to Newcastle.

Mr. J. THOMPSON (West Melbourne) said that they had several trial shipments of Maitland coal, and from a Superintendent's point of view, he would not like to use any other. There was no difficulty in keeping up the illuminating power of the gas, and no trouble with clinker. The coke averaged 9½ cwt. for sale per ton of coal carbonized. With heavy charges the result was a good, hard coke which the maltsters all liked, and it was also a good suction plant coke. He preferred Maitland coal to Newcastle.

Other members having offered remarks,

The PRESIDENT said they were indebted to Mr. Figgis for introducing the subject. He (the President) had dealt rather fully in his address [see *ante*, p. 423] with the question of Maitland coals, and therefore he did not propose to say much on the topic. There was no doubt that Maitland coal was one of the best gas coals in the world. It was a coal of which he considered they did not yet know the potentialities. He hoped that before long, owing to a better knowledge as to the way to carbonize it, they would be talking of makes nearer 13,000 than 12,000 cubic feet in steady working. Whether or not this was going to be done in horizontal retorts he was not quite sure; but he certainly thought they would be able to do it when the retorts were turned on end. The question of whether or not they used Maitland or Newcastle coals must be decided very much by local conditions, having regard to the sales of residuals; but the day was undoubtedly near when the Newcastle coal would not be obtainable at all. The Maitland coal certainly had advantages, and one was that the coke was a very much kinder coke in the furnace. Producers would run for at least 48 hours without clinkering; while the amount of ash was small in quantity, and did not contain those fluxes which brought about the consolidation of clinker. He would just mention this point—that Maitland coal, on account of its large gas-yielding properties, would have the effect of reducing the amount of gas-producing plant required on gas-works, large or small. Therefore it would have a tendency to decrease capital outlay on carbonizing equipment.

II.

"*How will the Daylight Saving Bill affect the gas industry?*"

Mr. R. BEARUP (Stawell) considered that the Bill would, if carried, have a most disastrous effect on all lighting concerns—whether electric, gas, or candle works—that were in a small way of business. The State was supposed to protect and foster industries; and surely the lighting industry was deserving of some consideration, as there was a large amount of capital invested in works. If the Bill contained any clause to compensate those whose businesses were injured, one could not cavil. The putting forward and backward of the clock seemed to him to savour somewhat of faddism.

Mr. W. SWINBURNE (Melbourne) thought there could only be one reply to the question as to how the Daylight Saving Bill would affect the gas industry—namely, that it would affect it unfavourably. If an hour was added to the daylight, an hour would be taken from the period of lighting. Therefore the receipts from gas, electric, or any other forms of lighting must suffer. The day consumption would no doubt be increased somewhat; but whether it would compensate to the full extent for the loss of an hour after dark, he could not say. Therefore he thought that the question before them could only be answered by the statement that the passing of the Bill would be detrimental to all lighting companies. If, however, there was to be a demand for the change, and it was declared to be of benefit to the community, he did not think they should oppose it. The chief evidence in favour of the Bill was that, if it were passed, more time would be available for amusement and sport; and he thought enough time was already devoted to this.

III.

"*I have trouble with ascension-pipes becoming blocked. What is the cause? And how can I prevent it?*"

Mr. T. GALE (Footscray) said that ascension-pipes in the best regulated retort-houses occasionally became choked with carbonaceous matter. One of the principal causes of this was back-pressure from too deep a seal in the dip-pipe, which was often immersed in thick tar. To run the tar off the hydraulic main often considerably lessened the evil, as the thick tar offered so much resistance to the gas getting away from the ascension-pipe. He always insisted on an augur being used every time the retorts were charged. He noticed there was a lot of difference in coal having more or less tendency to choke the pipes. When a pipe became choked, he found it the simplest plan to remove the cap off the bridge-pipe, and make a way through with the augur, or failing that a red-hot pipe; and, if the retort would stand it, to take the back out, and let the heated air make its way through the aperture. This would serve to clear the retort of carbon as well as clear the ascension-pipe.

Mr. J. BOWMAN (Sale) had had a fair amount of trouble with stopped ascension-pipes. One of the principal reasons was that a certain class of coal—the Wickham—which was not obtainable now, used to conduce to it. Of course, there were various methods of burning out and cleaning out; but the best plan he had found had been to put a little water-drip in the bridge-pipe, letting the water drop in steadily. The water got out through the mouthpiece on to the floor; and it was easy to gauge whether there was too much. They used very little water for the purpose. It was brought from an overhead tank; and the plan worked admirably. The ascension-pipes, in consequence, were always clean. He certainly would not do without the water-drip under any consideration.

Mr. J. W. BEAN (Wangaratta) said that occasionally he had a little trouble with blocked ascension-pipes. He found the best preventative was to keep as much heat going through the pipes as possible. If a stoppage took place near the mouthpiece, he took a 3-inch augur and cleared it thoroughly. If this was not done properly, the pipe would be stopped as badly as ever an hour after the charge was put in. His experience was that a screen placed between the ascension-pipe and the retort-bench, so as to allow an air space between the bench and the screen and between the screen and the pipe, proved very effective. After adopting this method at Wangaratta, he had had no trouble with choked ascensions.

Mr. C. W. HOWLETT (South Melbourne) said that, without going deeply into the cause of the trouble, there was a minor point the mention of which might be useful. Mr. Bean spoke about auguring his pipes. During the last fifteen months at South Melbourne, they had had three stopped pipes in their new installation; and now they were altogether a thing of the past. There was a good wrinkle in keeping them clear. Their Engineer (Mr. Hunt) had always insisted on having a good, large augur to try the pipes; and he had been very particular to see that the augurs were always the same size. Immediately they showed signs of wear, they were renewed; and, of course, augurs wore down from 6 inches to 3½ inches. If auguring were neglected, the carbon would form on the sides of the bends and give a great deal of trouble. He thought there was a great secret in seeing that the augurs used were kept at a proper size.

IV.

"*Does a gas cooking-stove fitted with a special browning burner give better satisfaction generally than the stove without one?*"

Mr. J. LORD (Williamstown) could not discover that there was any favour shown for stoves with browning burners. He did not think that, if a stove was used in a proper way, a browning burner was necessary.

Mr. E. TIPPER (Box Hill) found that among his consumers there was a distinct preference for a stove with a browning burner—provided, of course, that the person knew how to use it. It was also used as a large-sized grilling burner.

Mr. W. PAIN (Bendigo) thought the browning burner was only asked for through want of education in the use of gas-stoves. Pastry, scones, &c., could be easily browned with a stove not specially fitted with a browning burner.

Mr. A. CUSA (Shepparton) said that the few consumers who used stoves in his district called his attention to the smallest thing that went wrong with the browning burner. They preferred it.

Mr. J. W. BEAN (Wangaratta) remarked that the browning burner could be done without by making the cooker do the browning without having an extra frame on the oven.

The PRESIDENT (Mr. P. C. Holmes Hunt) said that, as the hour was getting late, they would postpone the discussion of the remaining questions until the next meeting.

CONCLUDING PROCEEDINGS.

ELECTION OF OFFICERS.

Mr. T. LORD (Geelong) said the pleasing duty devolved on him of proposing that Mr. Holmes Hunt be re-elected President for the ensuing year. The reason he had again been nominated was chiefly that it was his intention to visit Great Britain during 1910, leaving Melbourne during February*; and the Council thought it would be very fitting if he could be in England as President of the Victorian Gas Managers' Association.

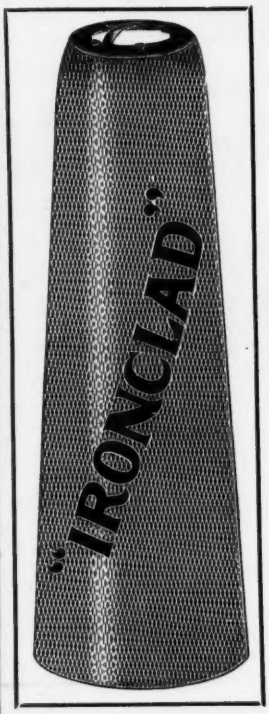
Mr. S. E. FIGGIS (Ballarat) seconded the motion. He said that there was one little matter which Mr. Lord had forgotten to mention, and that was that, in the natural order of things, the President this year should have been Mr. Lord himself; but he had most magnanimously stood aside. Mr. Hunt was not only going to visit the Old Country, but would also, he understood, cross the Channel and see what was going on in Berlin and other places, in order to ascertain what he could about the use of vertical retorts. As the members knew, the Germans were in the forefront in invention, not only in regard to gas, but to lighting generally. Consequently, he felt sure Mr. Hunt would be able, as the result of his travels, to interest them when the Association met again.

The motion was put and carried unanimously.

Mr. HUNT, in returning thanks for his re-election, said he appreciated very much indeed the honour the members had done in re-electing him as President for another year. It was with great diffidence that he consented to accede to the wishes of the Council in the matter, as he did not like the idea of postponing the promotion of the Vice-President (Mr. Lord), who had already stood aside the previous year on the plea that it would be well to have alternate meetings of the Association in Melbourne and the country. Mr. Lord, however, had assured him that he was quite willing to stand aside again. He (Mr. Hunt) would do his best to represent the Association in Great Britain or elsewhere, if and when occasion offered.

* We have since learned that Mr. Hunt's departure for England has been deferred till April.—ED. J. G. L.

THE



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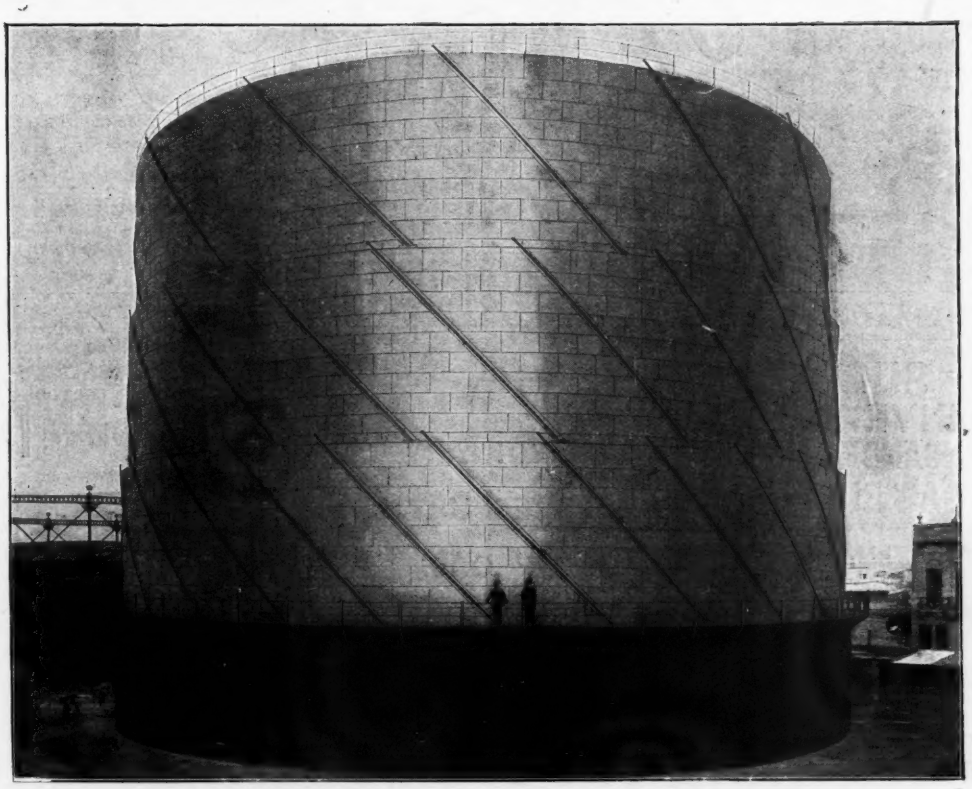

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The other officers appointed for the year 1909-10 were as follows:—

Vice-President.—Mr. T. Lord (Geelong).
Member of Council.—Hon. George Swinburne (Melbourne).
Auditors.—Messrs. J. Bowman (Sale) and J. Lord (Williamstown).
Hon. Sec. and Treasurer.—Mr. C. W. Howlett (South Melbourne).

Place of Next Meeting.

The President said the next business was to decide the place for the next annual meeting; and he begged to move that it be held in Melbourne. He wished to express the hope that every member would endeavour to help to make the annual meeting a success. They were stretching and enlarging their boundaries, as it were, and so extending the scope of the Association. Only the previous day they had approved of the election of a member from New South Wales. This suggested that they were likely to have requests for membership from other parts of Australia; and he hoped they would ultimately become a large organization, having members in all parts of the Commonwealth. Therefore it behoved members to provide the highest technical fare for their debates.

Mr. R. O. Thompson (Melbourne) said the intention was to have the meeting in the country in alternate years; but, under the presidentship of Mr. Hunt, and considering how well they were entertained, they might hold it in Melbourne again. It was a central place for people from all parts of the Commonwealth, and for visitors from over the sea. He therefore had much pleasure in seconding the motion.

The motion was put and carried unanimously, and the meeting then closed.

Visit to the South Melbourne Gas-Works.

As briefly mentioned last week (p. 430), on the afternoon of the first day of the meeting the members visited the South Melbourne works of the Metropolitan Gas Company, where they had an opportunity of inspecting the new carbonizing plant which has already been described and illustrated in the "Journal" [see Vol. CVIII., p. 307]. The members were much interested in inspecting the operations; twelve-hour charges being worked. A feature of considerable attraction was the travelling platform and coke-shoot illustrated on p. 310 of the above-mentioned issue, which appeared to find favour on all sides. In another part of the works the new sulphate-house was inspected, and also a large water-tank in course of erection, together with filter-beds, for storing all surplus water from condensers, coke conveyors, &c., for use again in the retort-house. Finally, the special water-cooling plant, comprising a Linde machine of a refrigerating capacity of 12 tons per day, installed for cooling the water supplied to the condensers and washers, was seen in operation; and the system of condensation proposed to be carried out at these works, as outlined by the President in his address [*ante*, p. 429], was explained to the visitors.

The Presidential Dinner.

In the evening, the members and visitors were entertained at dinner by the President at the Hotel Victoria, South Melbourne.

After the toast of "The King" had been honoured,

The President proposed the health of the visitors. He said that the members of the Association had been honoured and delighted to see at the meeting so many friends in the profession from elsewhere. On the two previous occasions, they had visitors from adjoining States. This year they had representatives from all the States (with the exception of West and South Australia), and also from the Dominion of New Zealand; and he hoped that the presence of these gentlemen was an indication that, as time went on, an increasing number of visitors would honour them by their presence, and help them to discuss and thrash out the many debatable points connected with their business. The Association was now getting firmly established, and it must consequently become of more use and of greater power in the gas industry in their part of the world; and he ventured to express the opinion that it would draw to it members of the profession in all parts of the Commonwealth and the Dominion. On the present occasion, he felt that they had all benefited by the presence of their visitors. It was not a case of unity being strength so much as of unity being an education, for all must assuredly learn something at the meetings, and thus become of more use to the Boards of Directors whom they served. On this occasion, it was gratifying to know that the various Companies were helping them, and encouraging them to hold their meetings; and he would take the opportunity of saying how much he felt indebted to his Board for the help given to him in connection with the Association.

Mr. S. E. Figgis (Ballarat) supported the toast, and remarked how gratified they were to see so many representatives from other States, and how pleased they were to extend the right hand of fellowship to their friends from New Zealand, Queensland, New South Wales, and Tasmania. To him their presence indicated that the fame of the Association was extending; and he hoped that in time to come they would have representatives present from as distant a State as Western Australia.

The toast was enthusiastically honoured.

Mr. Hungerford (Dunedin, N.Z.), while thanking the members for his reception, said he greatly appreciated the kindly action of all who, at no little inconvenience to themselves, had made such successful efforts to render their stay in Melbourne a pleasant one. Melbourne had to him been a city of surprises; and among them the progress of the Victorian Gas Managers' Association had not been the least. He hoped Associations would be formed in other States and also in New Zealand; but he should like to see one large society established, which might have branches in the various States, and so arrange matters that there could be a big meeting in one or other of the various capitals from time to time.

Mr. Kempster (Waratah, N.S.W.) said that, though he had made a long journey to get to Melbourne, what he had heard and seen during his stay had well repaid him for the trouble.

Mr. Rabbidge (Invercargill, N.Z.) expressed his appreciation of the kind remarks made by the President, and of the hearty manner in which the toast had been received. In accepting the invitation to be present at the meeting, he felt that he was sure of a cordial welcome. The hospitable way in which he had been received surpassed his expectations. He would thank the Secretary (Mr. Howlett) for his constant endeavours to show the visitors as much as possible, and make them comfortable. As for the business part of the meeting, he had learned very much from the discussions; and to him the visit to the South Melbourne Gas-Works was a revelation. It showed him something of what could be done in the gas industry. Of course, they worked on similar lines in New Zealand, but in a much smaller way; and it was astonishing to him to see the orderly manner in which such large works were carried on. It was evident that at South Melbourne a big scheme had been laid out, and would some day be brought to completion; and he thought that a day spent there by any gas man was something of an education. When he returned to New Zealand, and saw any of his brother gas managers, he would certainly tell them they had missed the chance of a lifetime not attending the Victorian Gas Managers' Association meeting.

Mr. Barson (Broken Hill, N.S.W.), Mr. Scoles (Ipswich, Queensland), and Mr. Allan (Hobart, Tasmania) also briefly responded.

Mr. Barson proposed the health of the President, and wished him an enjoyable and useful time during his contemplated visit to Europe.

Mr. Kempster supported the toast, which was drunk with musical honours.

The President, in acknowledgment, remarked that he had been very pleased to be of some little assistance in making the meeting a success. He was pleased to say there existed a freemasonry among the gas men in Victoria equal to anything of the kind in any other part of the world; and he hoped that when their visitors went back to the various States and to New Zealand, and came in contact with their fellow-managers, they would tell them that they had only to send the Secretary of the Victorian Gas Managers' Association an intimation that they were going to Melbourne about the first week in November, and they might rely on a hearty welcome at their meetings.

Inspection of New Lighting Installations.

The company then dispersed, and proceeded to the Beaconsfield Parade, on the sea-front, in order to inspect the new installation of lighting recently put up by the Metropolitan Gas Company in conjunction with the South Melbourne City Surveyor (Mr. A. E. Aughtie). In this scheme, Kern burners are used throughout. The lamp-columns are placed at short intervals in the reserves along the foreshore; the columns being of the well-known Paris pattern, erected on special bases, and fitted with two brackets from which are suspended globe lamps, each containing three Kern burners. The details of the installation were explained to the members and visitors by Mr. G. F. Harper, the Chief Lighting Inspector of the Gas Company; and the excellent lighting was much admired by all. Later in the evening, the company walked to the St. Kilda Esplanade, and inspected the special lighting there. In this Paris columns (first introduced to Melbourne by Mr. Hunt for this installation) are also used, and are placed about 40 yards apart. The lanterns—made in the Company's own workshops—are of the shadowless type, and each contains three No. 4 Kern burners.

The Midland Association of Gas Managers will hold their annual general meeting in Birmingham on Thursday week (the 3rd prox.), when the new President, Mr. Vincent Hughes, of Smethwick, will deliver his Inaugural Address.

Leeds and Butterfield on Acetylene.—We have received from Messrs. Charles Griffin and Co., Limited, of Exeter Street, Strand, the second edition, enlarged and revised, of "Acetylene: The Principles of its Generation and Use," by the late Mr. F. H. Leeds, F.I.C., and Mr. W. J. Atkinson Butterfield, M.A. The book was originally brought out in the summer of 1903; and its revision for a new edition was already far advanced when it was interrupted by the sudden death of Mr. Leeds about two years ago. The revision was, however, continued by Mr. Butterfield, with the help of the very full notes which his collaborator had left. The result of his labours, as presented in the volume just published, will be more fully noticed in a subsequent issue. Meanwhile, we may mention that the price of the book is 8s. 6d. net.

GAS v. ELECTRICITY FOR HEATING AND POWER.

Debate between the Manchester Junior Gas Association and the Electrical Engineers.

The debate between members of the Manchester and District Junior Gas Association and the Manchester Students' Section of Electrical Engineers, on "Gas *v.* Electricity for Heating and Power," took place last Tuesday in the Manchester School of Technology. There was an attendance of about 150. Mr. V. NELSON DODGE, the Engineer to the Bradford Dyers' Association, was voted to the chair, on the motion of Mr. James Taylor, of Mossley, President of the Junior Gas Association, seconded by Mr. L. J. Jepson, of the Electrical Engineers. It was explained that, for the purposes of the evening's discussion, the price of gas would be taken as 1s. per 1000 cubic feet, and of electricity at 1d. per unit.

Mr. C. WOODHEAD opened for the gas engineers. He said that, though in no way belittling the great potentialities of electricity, he would endeavour to convince his hearers that for heating purposes it was an absolute failure at the present time on economic grounds. The amount of work performed in this sphere of labour being entirely dependent upon the number of British thermal units evolved from a unit of the fluid employed, and the efficient application of the same, it was necessary to acquaint themselves with the relative monetary value of an equivalent of each. Calculating from the prices agreed upon, they got the following preponderance in favour of gas.

	Amount of Fluid.	British Thermal Units.	Cost.
Electricity	1000 watts	3425	1·0
Gas	5·71 cubic feet	3425	0·0685

Or a penny would give 3425 units from electricity, but 50,000 from gas—an advantage of 15 to 1 in favour of gas. Having this great disadvantage to begin with, it was no wonder that electricity was at a standstill, and only adopted where novelty was the ruling passion, and expense a matter of entire indifference. Coming to a practical application of the respective fluids, he would place before his hearers a true bill of cost for heating two rooms for one year; the area being taken to meet the capabilities of the best electric heaters on the market and gas-fires chosen to suit. In the first case—that of a room with an area of 1600 cubic feet, with an average daily use of five hours—they got the following results: Gas-fire—ornamental stove, £1 12s. 6d.; gas consumed, 15 cubic feet per hour, £1 7s. 4½d.; and renewals, 6d.; making a total of £3 0s. 4½d. Electric radiator—radiator, £4; current, 1000 watts per hour, £7 12s. 1d.; and renewals, 4 els. at 4s. 6d., 18s.; or a total of £12 10s. 1d. This test gave them four times the cost by electric heating for the first year, six times for running expenses, and a saving of £7 per annum if gas were used. In the second case, the area of the room was 4000 cubic feet, and the average daily use the same (namely, five hours); the details being: Electric bronzed gas-fire, £4 18s. 6d.; gas consumed, 30 cubic feet per hour, £2 14s. 9d.; a total of £7 13s. 3d. Elerector, £12; current, 3000 watts per hour, £22 16s. 3d.; a total of £34 16s. 3d. The advantage for gas here on the first year was nearly 5 to 1, and running expenses 9 to 1, or a saving of £20 per annum. His experience of a gas-fire regularly in use for three years was that the renewals were *nil;* but with the electric radiator he was informed that it was generally found necessary to replace each element at least once a year. Turning to the cost of heating workshops, factories, churches, public halls, &c., he submitted the following economic statement relative to the three forms generally used for this purpose:—

	Electric Radiator.	Gas Steam Radiator.	Gas-Fire.
Consumption per hour	1 B.T.U.	12·0 cub. ft.	25·0 cub. ft.
Total heat produced B.Th.U.	3425	7200	15,000
Available heat B.Th.U.	3425	7200	10,500
Cost per hour	1d.	0·144d.	0·3d.
,, of equivalent heating value	3·1d.	0·210d.	0·3d.

In this calculation, he had only allowed an 80 per cent. efficiency for the gas-fire, but clearly showed the enormous advantage, on equivalent values, of 15 to 1 in favour of the gas steam radiator, and 10 to 1 in favour of the gas-fire. He asked them to compare a well-known and tested gas steam radiator, suitable for heating 10,640 cubic feet in factories and workshops, against the electrical appliances on the market for doing the same work. The tested consumption of gas in this appliance was 23 cubic feet per hour, giving them 13,800 B.Th.U. per hour, all of which was available for use. They would require at least four five-element radiators or two elerectors. How did they compare here for cost at the end of twelve months, the average daily use being taken as eight hours? In order to illustrate his point, he submitted the following figures:—

Gas.	
One gas radiator	£11 0 0
Gas consumption	3 7 2½
Renewals	—
	£14 7 2½

Electricity.			
Four radiators—			
Five Els.	£25 4 0	Two Els.	£24 0 0
Current	60 16 6	Current	73 0 0
Renewals	4 10 0	Renewals	—
	£90 10 6		£97 0 0

Here, again, they had an advantage for gas of 7 to 1 on the first year's cost, but over 20 to 1 for current consumption. As these elerectors were only advertised for 4100 cubic feet capacity, it would be necessary to put three of them in instead of the two he had taken for comparison. These examples could be multiplied times without number—all indisputably proving the vast superiority of gas from a thermo-dynamical standpoint, as well as on economic grounds. Another sphere of usefulness where gas was largely adopted, and was rapidly extending, was for the heating of water for domestic and other purposes. He would demonstrate by statistics that the efficiency of gas over electricity was 12 to 1 on the heating of 120 gallons of water from 60° to 120° Fahr. He mentioned that at a well-known business establishment in London 200 gallons of water were boiled daily for teas, at a cost of 10d. Calculating this on the prices they were debating upon, they got a cost of 5½d. for gas. If electricity were used, the price for current would be 7s. 4d.—another 16 to 1 advantage for gas heating. A seven-course luncheon was recently cooked by electricity for 65 persons at a cost of 4s. 8d. Against this, an eight-course dinner for the same number of people was cooked by gas for 9d. A comparative statement relating to the cost of an electric cooker and appliances compared with a gas-cooker showed £19 0s. 6d. for the former, and £7 13s. 2d. for the latter. To this had to be added the exceedingly high cost for renewals with the electric method, whereas they as a rule obtained a gas-cooker for nothing, or at most for a nominal yearly rent, with no expense whatever for renewals or repairs.

Mr. L. J. JEPSON followed as leader for the advocates of electricity. At the outset, he complained about the prices arranged; saying they made his task almost hopeless. Still, there were, he submitted, other factors to be considered besides that of price. The vital point at issue was whether electricity could, or did, compete favourably with gas for domestic and industrial purposes. If so, under what circumstances. With the price of 1d. per unit for electricity, and 1s. per 1000 cubic feet for gas, electricity had in some cases absolutely no chance, and in most of the other cases very little chance, on the question of price. Out of curiosity, he obtained from the returns the average price paid for a unit of electricity for heating purposes in England; and it came out at 1·7d. This included both small and large stations; the price varying from ½d. to 3d. Then he obtained the average price of gas of the first 75 places on the list of towns where a special price was quoted for heating; and this came out at 3s. 9½d. per 1000 feet. Then he took the average price quoted by the first 50 places having an output of at least 100,000,000 cubic feet; and it came out at 2s. 5d. per 1000 cubic feet. This included the price for gas-engine supply, where heating was not specially quoted. These figures allowed of a reasonable comparison to be made for many operations with various classes of apparatus. Where electricity could compete with gas, however, was in its utility, cleanliness, and healthiness. Ignoring for the moment the question of price, he asserted with confidence that there was no operation beyond that of poisoning which could not be as successfully performed by electricity as by gas. Gas engineers should remember that the real electrical industry was only 25 years old, and the heating section only about ten; further, that the price of current had only recently become sufficiently low to allow the consumer an opportunity to make a trial at a reasonable cost. Personally, he was of the opinion that the successful advent of electric heating was only made with the birth of the luminous radiator. Had the gas-heating engineer started with the same competition as the electric heating engineer, he would probably have had less successful results, not because of his lack of ability, but because of the natural disadvantages of his commodity. Gas heating was dearer than coal; and its present popularity was only due to its usefulness—especially in summer, and at odd times. Because of its greater usefulness, cleanliness, and healthiness, therefore, it was natural to expect that electricity would eventually oust gas from its present position. One of the most telling things he knew of in the history of the fight for supremacy in favour of electricity was the enormous increases in the number of articles now sold compared with the last five or six years. Up to 1904, the output of one of the largest, if not the largest, manufacturers in the country had only been between 4000 and 5000 articles; whereas for 1909 no less than 26,000 were sent out. These thousands were only missionaries of the millions which would follow as sure as day followed night. He defied any gentleman present to prove to them that any cooking operation could be done by gas which could not be done equally well by electricity, providing, of course, that each selected his own apparatus. He would go further, and say that any ordinary gas-stove which cooked directly by gas-flame tainted the food, unless special precautions were taken. Deny it as they might, the gas-cooker in the hands of the ordinary servant or person was a dirty article after some use, and consequently smells were emitted when heated. If they doubted this, let them study the gas trade papers for the week ending Jan. 29 last. The disadvantages he had spoken of were not to be found with the electric grill. Where the shoe pinched was that the electrical engineers had nothing much to lose and all to gain; whereas just

the opposite was the case with their gas friends, for they had the monopoly at present.

Mr. D. V. Hollingworth followed next on behalf of gas. Dealing first with the charge that gas-fires emitted fumes and products dangerous to health, he said it had been repeatedly proved that a normally burning gas-fire did not evolve into a living room smoke, carbonic acid, carbon monoxide, sulphur, or, indeed, any deleterious products whatever. It had sometimes been urged, to the disadvantage of gas, that viands cooked in a gas-oven smelt of gas. What nonsense this was! For culinary purposes, the heat from a gas-flame was well-nigh perfect; being far superior to the old-fashioned grill. Dealing with the chief ways in which heat was given off from its source, he would endeavour to show that the electrician's fondness for convection heating was not so much because he considered it the best way of doing the work, but because it was the only system that he could adopt which had a ghost of a chance of being economically successful. Convected heat could be easily obtained from an electrical radiator working at a temperature of about 200° or 300° Fahr.; but a respectable percentage of radiant heat could only be obtained when the electric elements reached a temperature above 1000° Fahr. It was well known what an extremely destructive effect such a high temperature would have upon the tubes and terminals foils and filaments, which went to make up the complicated electric radiator. In one of the most famous electric radiators on the market, there were fixed six glowers containing iron spirals. For each of these wires, the makers claimed an average life of 500 hours. So that in one year each spiral, working nine hours a day, would have to be renewed six times. Six times for each spiral and six spirals, made 36 spirals altogether, which, at 6d. each, meant 18s. a year for spirals alone, not to mention the trouble of pulling the stove to pieces once every ten days. Here was laid bare the mind of the electrician when he preferred convected to radiant heat for warming. A temperature sufficient to give radiant heat would mean oxidation of the wires, breaking of the glowers, melting of the enamel in which the elements were embedded, and, in short, it would, and did, mean the renewal of the entire heating elements every day or two, at a cost, in most cases, of 4s. 6d. a time. Let them contrast this with the utility and the stability of a modern gas-fire with its radiant heat. In the "business part" of the gas-fire there was attained a temperature of over 2000° Fahr.; and this could be kept up for years without a vestige of injury, on the outlay of 2d. on renewals. On the question of gas heating of rooms and ventilation, he said that, where a gas-fire was used, the products of human exhalation had no time to become deposited on the walls and ceilings, as in a room electrically heated. Where a gas-fire was used, the impurities actually passed through the fire, whereas by the use of a low temperature convector or elerector, there was no intense heat to destroy the impurities; and even where an electric radiator was employed, the heating elements were so enclosed by globes and glowers, shields and screens, that for the purposes of bacterial destruction they were absolutely useless. In the light of these facts, the modern gas-fire, constituting as it did such a perfect warming, ventilating, and sterilizing instrument, had been well-named the "refiner's fire." While not denying to electricity a certain sphere of usefulness in other directions, yet in the enormous field of domestic and industrial heating he most emphatically denied that electricity could attain a position of any importance. The day when Bunsen designed his burner, electricity was hopelessly beaten. To-day, in comparison with the gas-fire, electricity was thrice beaten; and in the days ahead, when the final conflict came, he did not hesitate to affirm his sincere conviction that electricity would still be beaten.

Mr. L. J. Lepine then took up the case for electricity against gas in connection with power. It seemed to him, he said, that the electrical representatives agreed to the low price of 1s. per 1000 cubic feet of gas for the evening's debate because otherwise there could have been no cause for discussion. Gas was not really a competitor of electricity for industrial power purposes; and the only reason why gas-engines were sold was that there happened to be places at the present time where electricity was not procurable. No doubt they would have figures produced that evening showing that gas power was cheaper; but in order to do this, their gas friends would have to take the worst electric drive possible—that was to say, they would drive by electricity the same way as they would drive by a gas-engine. Anybody who adopted a gas-engine, always without exception would have a group drive. The remainder employing an electric drive would take advantage of the enormous benefits derived from what was called the individual drive. This was a most important feature, and was largely responsible for the scrapping of large gas-engines everywhere. In big works, it was absolutely essential, so as to obtain economy and also high efficiency, that all machine tools and industrial machines should be, as far as possible, individually driven, so that there would be no unprofitable shafting employed. That was to say, a machine would only be running when it was actually wanted. Arguing that even with gas at 1s. per 1000 feet electricity was cheaper, he submitted figures as to the cost for a 30 H.P. installation. In this he allowed for one gas-engine driving the whole shop for the gas installation of 30 H.P. output, and allowed for three 7½ B.H.P. motors for the electric equipment, driving separate machines, or else separate groups. The figures for an electric installation came out about half that of the gas installation; and a great deal of unnecessary shafting was eliminated, together with the various losses incurred for the same. With regard to the running costs, there was an apparent saving with the gas-engine of £6 per annum. But this was completely wiped out in almost every case by reduced output, and therefore reduced profits, caused by breakdowns, starting difficulties, and prosecutions for nuisances; also rent of space required by the gas-engine, and loss of work from machinery which could have occupied the space. This he put down at anything from £10 to £100 per annum. Then if gas had been charged at 2s. instead of 1s. per 1000 feet, the £6 saving would have been more than absorbed. One never found a modern works of large or medium size driven by anything but electric motors—it would not really pay to use gas-engines. A gas-engine, he maintained, was no use where a variable speed drive was required, or where a constant speed was needed. Where it was possible to discard a gas-engine and put in an electric motor, one was amply repaid by the less attention necessary. In order to make apparent the vast differences between the gas-engine and electric motor, it was only necessary to specify the various moving and wearing parts of a gas-engine. Further, the disadvantages of the gas-engine were made more apparent when they considered the amount of space necessary as compared with the electric motor. Almost as soon as the gas-engine was put down, its troubles began. First of all, there was the starting difficulty; and where an engine was provided with tube ignition, it was necessary for the person responsible for starting-up to light the ignition-tube about half-an-hour before it was required to start the engine. To overcome this difficulty, gas-engine builders had to go to the electrician to purchase an electric igniter—a fact that at once demonstrated the advantages of electricity. The places where electric motors had superseded gas-engines were too numerous to mention; but he alluded to one firm in the Manchester district, makers of gas-engines, who were for power purposes replacing them with electric motors. Gas-engines above 30 H.P. were not to be considered seriously as competing with electric motors; and below 30 H.P. it was, he contended, actually cheaper in the long run to employ electric motors, owing to the less bother and the smaller space required. The following were the things they did not find with a gas-engine: Great reliability, high efficiency, low capital cost, steady drive, low cost of stores, low cost of repairs, saving of time in starting, saving of space, cleanliness, and simplicity.

Mr. C. E. Teasdale pointed out that, despite the unfair competition practised by their opponents, especially in rate-aided electrical supply undertakings, gas yet led the way with a considerable margin. If an electrical undertaking made a loss it did not matter; and if a small profit was shown, it was considered to be doing extremely well. On the other hand, gas undertakings owned by the local authority had to give up large sums out of profits in relief of rates—a system which often resulted in those having control of the electrical works offering current for power purposes at or below cost price. To prove this, he quoted some statistics presented by Mr. Snell, in a paper recently read before the Institution of Electrical Engineers. These were as follows:—

Authority.	Actual Charge Per B.T.U. d.		Correct Charge Per B.T.U. d.
Barking	1·686	..	1·747
Battersea	1·500	..	1·975
Fulham	1·000	..	2·024
Hackney	1·240	..	1·384
Hornsey	1·270	..	2·225
Ilford	1·324	..	1·440
Islington	1·370	..	2·214
Kingston-on-Thames	2·000	..	2·370
Leyton	1·623	..	1·857
Poplar	1·430	..	1·686
St. Pancras	1·000	..	1·838

Even under such circumstances, gas was much cheaper for power when compared with electricity. In the first place, they found that gas gave 50,000 B.Th.U. for 1d., while by electricity the consumer received 3429 B.Th.U. for the penny. He was prepared to admit that under some conditions the electric motor was preferable, even if costing more, on account of the small compass, and where required for intermittent use. Still, cost with most people was an important factor in the situation; and he directed his hearers' attention to the following table:—

Relative Costs of Gas-Engine v. Electric Motor.

Town gas, 1s. per 1000 cubic feet. Electricity, 1d. per unit.

Size in B.H.P.	Efficiency of Electric Motor.	Efficiency of Gas-Engine.	600 B.Th.U. Gas Consumption per B.H.P. per Hour.	Pence.		Pence.	
				Electricity Total Cost per Hour.	Gas Total Cost per Hour.	Electricity Cost per B.H.P. per Hour.	Gas Cost per B.H.P. per Hour.
1	87	80	24	0·86	0·29	0·86	0·29
30	91	89	15	24·6	5·4	0·82	0·18
300	93	90	15	241·0	54·0	0·803	0·18
1000	95	91	15	790·0	180·0	0·79	0·18

Looking at the table, it would be observed that the efficiencies of the motors were placed at a high figure; whereas those of the gas-engines were very moderately put. The B.Th.U. per cubic foot of gas were also low, and erred greatly to the advantage of the electric motor. A gas-engine was as efficient for 30 H.P. as for 1000 H.P. The consumption of gas was strictly proportional to the work done. One building could therefore be as economically driven as two. No extra labour was required for the engine;

and there were no make-ready expenses nor any stand-by losses. Even with gas at 2s. 6d. per 1000 feet and electricity at as low a price as 1d. per unit, gas was the cheaper mode of producing power, as was demonstrated by Mr. G. M. Brown in the "Electrical Review" some time ago. In further proof of his argument that gas was the cheaper source of power, he gave particulars of a test carried out at the works of Messrs. J. Linton and Co., Wolverhampton, by Mr. Thomas Canning. The gas-engine employed had been working six years on the same operation as the test, and was therefore, comparatively speaking, an old one. It had never been repaired from the time of its installation. The electric motor was a new one of the Byng Hawkins make, and marked 14 H.P., 260 volts, 1000 revs. The gas-engine maximum load was 16 H.P. For the test, the contractors had placed on each two identical sets of machinery by the same maker, and guaranteed to turn out the same amount of work. These machines were fully employed in the test of planing and moulding pine wood of exactly the same size. The gas-engine had 35 feet of shafting and six bearings; while the motor had only 16 feet of shafting and three bearings. Both performed their work admirably; and at the end of an hour both were stopped. The recorded readings of the meters were: Gas consumption, 110 cubic feet; electricity, 4·38 B.T.U. The cost of the latter, at 1d. per unit, would be 4·38d. per hour; and that of gas, at 2s. 10d. per 1000 feet, was 3·74d. per hour, or a saving of 0·64d. per hour. By converting this to the 1s. per 1000 rate, and working 3000 hours per annum, the saving by gas was £38 5s.; the cost by electricity being £54 15s., and of gas £16 10s.

Mr. A. R. Stelling referred to the flexibility of drive and adaptability of the electric motor to unfavourable surroundings. Next to flexibility, the marvellous capacity for overloads and sudden shocks formed the most important quality of the electric motor. The demand for small power was increasing enormously; and he maintained that this demand could only be met by the electric motor. The small gas-engine was too costly, too noisy, too dirty, took up too much space, and generally for small power was entirely undesirable.

Mr. F. Thorp, on behalf of the gas engineers, said that the point in the debate so far that must have struck even the most casual observer was the remarkable disparity between the figures and diagrams shown on the screen by the partizans of both gas and electricity. This, he was afraid, was due, first, to a desire on both sides to make their case as strong as possible, and, secondly, to the methods by which the calculations had been made and the sources of the reference for the compilation of the tables. He held, however, that his friends on the gas side, having an unassailable case, were able to make their calculations on indisputable authority, and had taken the electrical engineman's own statements for the calculation of the electrical data. Searching for data in a well-known electrical book, he came across a remark that from 25 to 55 cubic feet of coal gas were necessary to produce 1 B.H.P. As a matter of fact, it was everywhere recognized that, even with an ordinary sized gas-engine, 16 feet of coal gas would produce 1 B.H.P. They could quite see, therefore, that their electrical friends had been led astray by their own tutors. Jealous of their formidable rival, the electrical engineers had missed the uses of their own product, and had that night been "flogging the wrong horse" all the time. His gas friends had proved conclusively that gas as a prime-mover was far and away cheaper than electricty at the prices arranged for the debate; and that these charges were not imaginary, was proved by the fact that at Sheffield gas was supplied for over 1000 engines at this figure, while in Widnes the Corporation charged in many cases only 10d. per 1000 cubic feet. That in these two towns there was practically very little electricity supplied from the town mains to private consumers, amply proved the contention of those on his side. In Widnes, he understood, there were no places driven electrically, except where current was produced by gas-engines; and in Sheffield they had a recent authentic case of this substitution of electric current from the town supply by two Westinghouse four-cylinder engines of 150 H.P. each working on coal gas. Scores of similar examples could be given. That gas people were not prejudiced, was plain from the fact that in gas-works they used all kinds of transmission methods—electricity, compressed air, hydraulic power, or mechanical transmission—whichever best suited their purpose. He desired to explode the two popular fallacies that gas was of varying quality, and that electricity was of uniform excellence. A gas-engine constructed for Manchester gas would be suitable, without the slightest alteration, and with very little adjustment, for practically any coal gas supply throughout the world; while, on the other side, there were scores of—should he say?—qualities of electricity which required their own special motors to be of real service. In Manchester, they had principally direct current of a certain voltage; and motors were obtained suitable for the purpose. Suppose, for instance, it was necessary to move to Trafford Park, where they had alternating current, this machine would be absolutely useless. Again, take the case of works (say) in Salford, with alternating current, and remove them to Eccles, would the machine work well? No, because the frequency was different. These cases could be multiplied indefinitely. Let them contrast this with the gas-engine, which would work equally well in any of the places. If they must have electric transmission, then by all means be independent of the varying distributing systems and generate the electricity by a gas-engine. They had the advantage of engines from 8000 to ¼ H.P.; and he could demonstrate that it was possible to economically use gas down to a blue-bottle power. [At this stage, Mr. Thorp drew attention to a gas-driven fan he had on the platform, designed by Mr. Brockway, of Cleethorpes, which would run for 1000 hours for 1s.] In conclusion, he asked those present to assist the gas engineers in removing from the industry the old, obsolete, and unjust restrictions, both parliamentary and municipal, which hampered them, and to cease allowing gas profits to be appropriated for the relief of rates and the bolstering-up of rivals.

Mr. J. S. Messent then dealt with the flexibility of the electric motor and its quiet, smooth running.

Mr. J. Alsop (Stockport) next answered the call of the Chairman; his remarks being directed to show the disadvantages of electric heating and cooking. In most towns, he said, the cost of current for lighting was much more than 1d. per unit. Therefore, to take advantage of this price for heating and cooking, the consumer had to have an extra meter and wiring system installed, for which he generally had to pay. Again, should the unfortunate consumer remove to another town, his cooker and heater were rendered valueless, because an instrument designed to work on (say) 200 volts was quite useless on a 100-volt circuit until it was specially adjusted for that voltage, which could not be done *in situ*. On the other hand, a person could have a gas-range with all the parts standardized and suitable for use in any part of the world. A valuable feature about all gas appliances was the ease and delicacy of their adjustment by the simple manipulation of a tap. In an electric boiling arrangement, no matter what amount of liquid there might be in the pan, it was only possible to use two qualities of heat—the larger current to bring the liquid to the boil, and the smaller to keep it there. In their attempts to heat water by electricity, their competitors seemed to have been particularly unfortunate. In one system, the water was heated by a current passing directly through it. Now in proportion as the water was charged with salts, so would the water be subjected to electrolysis. When this occurred, hydrogen and oxygen were given off, and contaminated the water heated. Further, when electrolysis took place, there was a corresponding wastage of current, the work done in decomposing the water absorbing much electrical energy which ought to go towards heating the water; and, over and above all this, there was a big loss of energy due to the conductivity of the water—there being also continual decomposition of scale in the apparatus, which still further reduced its utility. Such was the magnificent efficiency of this geyser, that it would give the enormous quantity of one whole pint of lukewarm water per minute, with a consumption of 1000 watts, and an initial cost of £3 10s. As to the relative reliability of the two heating fluids, it was very rare indeed for the supply of gas to fail. On the other hand, a cessation in the supply of electricity was only too common. What would occur in the event of the current to a radiator failing during a critical period in the sick-room?

Mr. A. L. Hawes said it was a striking circumstance that gas engineers themselves were awakening to the fact that electricity was the ideal power, as there were several gas-works in the country where electricity was extensively used to drive auxiliary and coal-handling plant. Again, a large English firm of gas-engine builders drove almost all their works by electric motors. He defied anyone to find a gas-fire that did not smell.

Mr. W. L. Heald (Preston) drew special attention to the fact that with two of the largest insurance companies in the country, the premiums charged per horse power were slightly in favour of the gas-engine. He had before him a list of insured plant—namely, gas-engines and electric motors—giving the amounts recently paid by a prominent insurance company for accidents. In the case of the gas-engine, the amount paid per accident was £7 7s.; whereas in the case of motors (motors only), the amount was £10 8s. He also noticed that the National Boiler Insurance Company sent their inspectors to electrical plant three times a year, as against twice to gas-engines. He asked if they had ever heard of a gas-engine being stopped because a corporation workman had driven his pick into a gas-main. Occasionally the gas-mains were broken; but, except on the outskirts, there was no cessation of supply, on account of the network of mains being jointed at so many different points.

Mr. R. H. Ginman (Birkenhead), among others contributing to the debate on the side of gas, said that for direct-heating by fires, condensing stoves, &c., gas had now become enormously popular; while for indirect heating in steam and water radiators, it was equally largely used. Buckingham and Kensington Palaces, the Mansion House, Covent Garden Theatre, and, above all, the offices of the General Electric Company in London, were all of them heated by steam-radiator, in which the heating fluid was gas. Coming nearer home, he mentioned the case of the Central Theatre, Altrincham. During the winter of 1908, an attempt was made to heat the place by four large electric radiators. The cost of current at 4d. per unit came to the enormous sum of 27s. per week; and the management were only using the radiators from two to three hours a day. At the beginning of the present winter, the whole lot were thrown out, and gas-heated steam radiators substituted. The average cost for gas, at 2s. 5d. per 1000 cubic feet, had been only 6s. a week, notwithstanding that the gas-radiators were kept burning eight hours each day.

Mr. J. M'Nicholl (Warrington) said that if the electric motor possessed all the advantages over the gas-engine which their friends claimed, gas-engine builders must be having a bad time indeed. But what were the facts? If they looked at the reports of the various makers, they found the trade increasing consider-

ably year by year. A great deal had been said on the other side about the convenience of very small motors. He admitted that gas-engine builders in this country did not do much to cultivate this field. He supposed the reason was it required the whole of their energies to meet the demand for medium and large sized engines. For power up to 4 or 6 horse, used only for a few hours per day, for small industries, the new quick-running gas-engine was not dearer as regarded first cost than electric motors of the same power; and it had already been clearly demonstrated how much could be saved in the cost of running. Besides, the ground area required for these was not greater than that needed for electric motors of the same power. As to reliability, he mentioned the case of the North-Eastern Railway Company. This Company had installed an electro-pneumatic signalling station at Newcastle; and before deciding upon the motive power to be employed, the claims of both gas and electricity were fully inquired into. It was found that in the preceding two years there had been six partial failures of electric supply; and a failure of gas in Newcastle had never been recorded. It was eventually decided to instal four gas-engines and two motors; and this decision had been amply justified. Some time after their installation, the gentleman supplying these particulars called, and found one of the motors not in use, as the armature had burned out.

The CHAIRMAN, in summing up the debate, said the great thing was the supply of electricity at a price to make it a commercial success. There was no doubt in his mind that gas for motive power held the advantage as to price; and, again, gas engineers could certainly claim that their system for heating and cooking was reliable, if at times a little objectionable because of the smell. From his own experience, he found that gas taken through the ordinary engine at 2s. per 1000 cubic feet and electricity at 0·55d. per unit just about compared. This being the case, it was not a commercial success to take current from the local supply company for large works.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to the Keighley Gas-Works.

The advantage of a visit to gas-works as a regular part of a Junior Association programme was well exemplified last Saturday, when the Yorkshire Junior Gas Association visited the Keighley Gas-Works. These works had been planned and erected by the late Engineer, Mr. John Laycock, whose long tenure of office had stamped them with the impress of his personality and his fertility of invention; so that wherever the visitors turned they found something of interest and often of novelty. Under such circumstances, the large attendance was only what had been anticipated; and their high expectations were fully realized. Mr. John Harrison, the Chairman of the Gas Committee, and Mr. W. Baillie, the Engineer, received the members; and, to their great pleasure, Mr. John Laycock joined the party soon after, and assisted Mr. Baillie as guide.

The great attraction, of course, was the installation of the Telpher coke-conveying plant—the first of its kind in the North of England, and the first instance of aërial conveying plant that most of the visitors had seen. It was described and illustrated in the "JOURNAL" when it was erected [see Vol. CV., p. 373]. It was closely examined in its operations, and questions were freely asked. The comparative fewness of men needed in the retort-house was much commented on, as was the celerity and ease with which 18 cwt. lots of coke were removed, slaked outside the retort-house, and delivered to the coke-breaker and screens or else run 800 feet to the end of the coke-yard. Slaking is completely under control; and the time for which the coke-skip and its contents are immersed in water is so calculated that after breaking and screening the coke is still warm, and contains a minimum of moisture. Under such conditions, it is not surprising that a large and growing demand for coke exists in Keighley and the lime-burning districts of Upper Airedale. About 25 per cent. of the coke is broken and screened; there being a considerable demand locally for the smaller sizes on blacksmiths' hearths at the local engineering establishments. One notable advantage of the Telpher system is the avoidance of the formation of breeze, as the skip can be lowered before turning over, and thus very little fall is given to the coke.

The other mechanical accessories of the retort-house are equally up-to-date. Coal is delivered direct from the railway waggons into a large hopper placed over the coal-breaker. This hopper is sufficiently large to admit of waggons being discharged from the end, sides, or bottom; and from it the coal is automatically fed to the breaker in a steady delivery. The works locomotive is appropriately named "Murdoch." The usual elevator, hoppers, &c., are provided for the De Brouwer charging-machine; the De Brouwer-Jenkins ram is used for discharging. Both are placed on the same side of the bench. The machines and the conveyor are operated electrically; each having its own Siemens plant driven by "National" gas-engines. Instead of duplicating these, they are so arranged that in the event of either breaking down the other plant can be made to work both the machines and conveyor; the margin of power being enough to manage this as a temporary expedient. The settings are in nines, with regenerator furnaces. Braddock's retort-house governors are employed, and tar-towers are installed. These received much attention; and Mr. Laycock (to whom their special feature is due) was in constant requisition for explanations. By the addition, at the bottom of the tower, of an extra liquor-filled chamber, into which the tar is run from the tower preparatory to sending it to the tar-well, the seal is maintained unchanged, even when thus running off the tar, as the lower vessel is then shut off from the hydraulic main.

The retort-house engrossed much of the time of the visitors, but the works contain many other features of interest. Begun in the year 1876, they were planned by Mr. Laycock with the view of finally consisting of three independent units, each of a million cubic feet daily capacity. The second unit was constructed in 1886; and vacant places about the works are reserved for the third unit, whenever its erection becomes necessary. The site of the old works is between one and two miles away, and still contains a 300,000 cubic feet holder, from which 70 per cent. of the total gas supply is delivered. This is fed by a 12-inch main, which has for some time been insufficient for the work devolving on it. As special local conditions rendered the substitution of a larger new main difficult, recourse was had to "boosting;" and a Sturtevant fan, driven by a De Laval steam-turbine, was installed. This was shown in operation. It delivers gas at a pressure of about 12 inches at its outlet. The service holder is made to close a valve as it rises to its full height, and so cut off the gas supply; while, as an automatic water-loading arrangement is attached to the station governor, no constant attendance is needed at the station. It is noteworthy that during the three-and-a-half years it has been in use this plant has needed no repairs whatever, and still works with complete smoothness and satisfaction. This, of course, partly results from the almost affectionate watchfulness extended to all machinery on the works; the signs of it being noticeable throughout the whole visit.

Other features of interest were one purifier-house with hydraulic rams for lifting the lids, the other house having had its boxes extended and converted into the dry lute type, with Clapham's arrangement for tightening-up the fastenings, and a naphthalene washer which was a board-filled scrubber instead of a Livesey washer or a rotary washer-scrubber as generally used. Mr. Laycock's well-known washer-scrubber (filled with 1¼-inch diameter wood balls) originated on these works, and the first machine is still in use. The gas-works are in rather an exposed situation; and the presence of horizontal wind-plates on the holder cups was explained, and proofs of their need were quoted.

At the conclusion of the visit, the company were conveyed by special tramcars to the Town Hall, where they were entertained at tea by the Gas Committee. At the close of the repast,

The PRESIDENT (Mr. S. W. Shepherd) moved a vote of thanks to the Committee and their Chairman for the permission they had given to visit the works, and for their kindly provision of refresh ments, also to Mr. Laycock and Mr. Baillie. He spoke of the great interest all had felt in going through the works, of the unstinted readiness of everyone concerned to give information and explanation, and of the exceptional nature of what had been seen. They appreciated the honour of the Chairman's presence among them. He congratulated the Committee, through their Chairman, on possessing most up-to-date works, if any gas-works dared to call themselves fully up-to-date if they had no vertical retorts. At any rate, they had what was probably the last word in labour-saving devices.

The motion was spoken to by Messrs. ATLEY and CRANFIELD, and carried by acclamation.

Mr. HARRISON briefly replied; assuring the members of the pleasure he had had in welcoming and accompanying them, and of his pride in the works over which he presided.

Mr. LAYCOCK said the visitors were donning their armour; and he had just put his off. He had enjoyed meeting them, and was happy if he had in any way been able to add to their understanding of the works. He wished them every happiness and professional success—saying he could hardly wish them a happier time or more pleasant relations with employers than his had been with the Keighley Corporation. His mind had been going back and reflecting on the great changes of the last twenty-five years. A quarter-of-a-century ago they had as many retorts in operation as now, with but half the present output. He could remember when they were satisfied with 6000 to 7000 cubic feet of gas per ton of coal; whereas now they sold 11,000 cubic feet, and had designs on still higher figures. The price of gas had been 4s. 2d. per 1000 cubic feet; and it was now 1s. 11d. to 1s. 5d. Burners had joined in the general advance, and instead of an efficiency of 3 candles per cubic foot of gas burnt, they now got 30 candles and even 60 candles with compression; so that now 1s. worth of gas gave as much illumination as formerly needed 20s. to buy. This improvement was wonderful for so few years; and he was full of hope and high expectation for advances in the future such as would place gas in an absolutely unchallengeable position among illuminants.

Mr. BAILLIE thanked the members for coming in such large numbers, and assured them of the pleasure their visit had afforded him. He said they must remember that the credit for installing the Telpher system was entirely due to Mr. Laycock; and theirs was the first that actually entered the retort-house as well as traversed the yard. Their machines and conveyor had effected very considerable saving in the carbonization bill; in fact, including all charges that could in any way be classed under carbonization, it worked out at about 1½d. per 1000 cubic feet in wages, and this in spite of fairly high wages and a three-shift system.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

Visit to the Broxburn Oil-Works.

Last Saturday afternoon the members of the Western District Division of the Scottish Junior Gas Association, to the number of between thirty and forty, paid a visit to the works of the Broxburn Oil Company, Limited. Arriving at the works at half-past three, they were met by Mr. G. M'Killop, the Assistant Chemist, who proved to be an exceedingly efficient guide; describing every process and product in clear, concise language, and with commendable brevity.

Beginning in the laboratory, Mr. M'Killop first exhibited a piece of shale, which he explained had been deposited as a sort of mud, and which had changed organically until it became the material it now is. Then he described the process of retorting in vertical retorts of great height, into which the black coal is placed cold, at the top, and in its downward course passes through the heat zone, and again becomes cold before the spent shale is drawn off at the bottom. He stated that at first the retorts in which the shale was carbonized were horizontal, the same as are used in gas making. When vertical retorts were introduced, they were half the size of those now employed. Vertical retorts yield more both of oil and ammonia. Four-and-a-half tons of shale are charged into a retort in a day, and it takes 24 hours for the charge to travel from the top to the bottom. During the whole time a current of steam is kept passing up the retort. The oil comes off in the upper part before the highest heat is reached, and at this heat they got ammonia and permanent gas. The vapour products, after being condensed, are separated—the crude oil going to the refinery, and the ammoniacal liquor to the sulphate works. Specimens of the various oils obtained in the distillations in the refinery (motor spirit, naphtha, burning oils, and lubricating oils) were shown; and also the other valuable product, paraffin wax. The treatment of the oil, between distillations, with sulphuric acid and caustic soda was explained; and it was also stated that, after the burning oils are extracted, what remains is sent through a refrigerator, the product being put into bags subjected to pressure, which separates the blue oil from the paraffin wax. In the working-up of the blue oil, gas oil is obtained of two qualities—one of from ·840 to ·850 sp. gr., and the other of ·870 sp. gr. The residue is lubricating oil.

The company then started to walk round the works. The retort-bench was first visited. There it was explained that in the course of the retorting sufficient gas is obtained to heat the bench; the gas being used unpurified. The only other heat required is in the raising of the steam, for which coal is used. After inspecting the retort-bench, the sulphate-house was visited, where it was explained that two processes are used—one being a vacuum process, which produces crystals of great purity. The yield of sulphate is about 45 lbs. per ton of shale. The visitors then passed into the refinery, where it was shown how the permanent gas which comes off is collected, and so much of it as is required sent to be purified, and then used for illuminating purposes in the works and the town of Broxburn. The rest, with the tar produced in the process of refining, is used to heat the stills. The company were afterwards taken to the department where sulphuric acid is made, to the refinery for paraffin wax, and to the candle factory.

The PRESIDENT (Mr. D. Currie, of Stirling) proposed a vote of thanks to the Broxburn Oil Company for the privilege which had been afforded the members of the Association of visiting the works, and particularly to Mr. M'Killop for his services as guide. He said the visit had been most interesting and instructive; and he had no doubt all had greatly benefited by it.

Mr. M'KILLOP, on behalf of the Company, expressed the pleasure they had in receiving the Association. He hoped they had all understood what they had seen, and the explanations which had been given. The Company would be pleased to see the members again at some future time.

This concluded the proceedings.

It was announced, at the meeting of the Illuminating Engineering Society last Tuesday, that three gentlemen to whom honorary membership had been offered by the Council had accepted the nomination. They are: Professor A. G. Vernon Harcourt, Sir William H. Preece, and Sir Joseph W. Swan.

At the annual meeting of the Institution of Mechanical Engineers last Friday, the Council reported that there had been 430 additions to the membership during the past year; but as there were 305 deductions, the net increase was 125. This raised the total from 5458 on Dec. 31, 1908, to 5583 at the close of last year.

In recognition of more than thirty years' services as Hon. Secretary to the Departmental Soirée Committee, Mr. T. R. Burley, an old and esteemed official of the Manchester Corporation, was last Friday evening presented with a gold watch, subscribed for by his colleagues. The gathering took place at the gas offices; Mr. Fred. A. Price, the Superintendent of the Department, presiding, and the presentation being made by Alderman Gibson, the Chairman of the Gas Committee.

GENERATOR FURNACES FOR SMALL WORKS.

By J. W. BEAN, of Wangaratta.

[A Paper read before the Victorian Gas Managers' Association.]

As is well known, generator or regenerative furnaces are constructed so that the primary air supply entering at the bottom of the furnace is just sufficient for the combustion of that part of the fuel lying nearest the place of ingress of the air, and that the carbonic acid (CO_2) thus produced, on passing through the rest of the fuel, is formed into carbonic oxide (CO). This is delivered, in most cases, through nostrils into a space above the furnace arch, termed the combustion chamber. Here it is met with a regulated supply of secondary air, which has been heated through flues; and this supports the combustion of the carbonic oxide, and gives off a great heat. The gases from the setting, after having done their duty in heating the retorts, are led through passages to the main flue.

I have worked a generator furnace for the past seven years (2150 days' actual work); and the results are as follows: Make per ton for the past three years, average 11,220 cubic feet; sold per ton, 10,250 cubic feet. The following are results for the half year to June 30, 1909, after the retorts had been in use 911 days:—

Coal carbonized	206 tons.
Gas made	2,340,200 cub. ft.
Gas made per ton of coal	11,345 ,,
Gas sold do.	10,053 ,,
Gas used on works per ton of coal	149 ,,
Gas unaccounted for do.	1,143 ,,
Coke sold do.	6 cwt. 5 lb.

I would point out that we cannot get the same coke results as the larger works, owing to the small demand for gas on certain days; and having to keep (say) three retorts working to supply a demand two days in a week, while for the other five days a bed of two retorts would do. The bed in question, for instance, was kept fairly well going during the two months ending the 31st of August last, when 78 tons of coal were carbonized, producing 32 tons 13 cwt. of coke for sale, equal to 8 cwt. 2 qr. 3 lbs. per ton of coal. Yet the average made for sale for the half year was only 6 cwt. per ton, because in the summer months, when only making 300,000 cubic feet of gas per month, 125,000 cubic feet are used for eight days—viz., Friday and Saturday each week. As my storage is only 18,000 cubic feet, I have to keep three retorts to meet this demand; while in the winter months the make is nearly 500,000 cubic feet, and is more evenly required.

The best coke results are obtained when the setting is doing its full work. Our retorts are 22-inch by 14-inch and 9 feet long; and the most I have carbonized for 24 hours is 42 cwt.—14 cwt. per mouthpiece. This was with 2-cwt. charges, 3 hrs. 20 min. per charge.

The generator furnace has several points in its favour for adoption in small works—viz.: (1) It only requires attention every six or eight hours, thus allowing the attendant more time for his other duties. (2) The uniformity of heat—even when being cleaned or early in the morning—as no closing of the dampers is required. (3) A greater quantity of coke is available for sale. (4) More gas is made per mouthpiece and per ton of coal. (5) The life of the retorts and furnaces is longer.

I have been working regenerative and generator furnaces for some time, and I think that, for small settings, the simple generator is the best. Regenerators seem too sensitive on a small scale, and work very differently when in a bed of seven or eight retorts.

In the construction of the small setting, like that of the larger, the workmanship should be good, the bricks well fitted and tied, the flues made easy to clean, and the furnace doors well fitted and insulated from the heat. A badly-fitting door spoils results, as the air supply cannot be controlled. The feeding-door and frame should be well protected by brickwork, and the clinkering-door of good size, to allow of easy access to the bars. The lining of the furnaces should also be arranged so as to permit of easy repair, as most managers of small works have to reline their furnaces. The fire-bars should be made easy of removal, and be placed on rests not too thick, as they hold the clinkers up when cleaning. The arch over the clinkering-door should be cut away a little, so that in case of clinker forming on the front wall, it can be cleared. The water may be conducted to the bars in many ways. Personally I prefer to run it down two sloping trays—the one taking the water first sloped towards the fire, and the other protruding a little beyond the edge; first sloping towards the front so as to be easily seen, and the water then conducted from this to the fire-bars.

Mr. BEAN asked to be allowed to supplement his paper by a few remarks. As to the repairs to the lining in his setting, he had arranged for the whole of the secondary-air flues to be almost independent of the furnace lining, so that in case of the furnace requiring relining they could take out the portion of the brickwork which was destroyed without interfering with the secondary flues. The furnace referred to had not required relining since it was installed, though the retorts had been replaced. He had some trouble with clinker forming in the wrong place; and as he could not get to it when formed in that way, either from the upper or the lower part of the furnace, he had to have part of the brickwork cut away. The doors for the small set gave them some little trouble when it was first installed; but later he designed a

door in which nearly all the ironwork was insulated with brickwork. This door had been in use for 900 days without being any worse than when it was first put in; whereas in the original setting he had two doors, and the heat destroyed them. In working the settings, it was important that the primary and secondary air admitted should bear some relation. There could be no fixed rule, as each setting required different manipulation. His method of testing was to have a mica slide fitted into the sight-hole of the combustion chamber. If he found there was combustible gas passing through, he increased the secondary air. The primary air was worked in a similar manner—that was to say, when once they had the desired heat they regulated the primary air. Of course, this method was rather crude for large works, where the waste gas would be analyzed. This required chemical knowledge, and he was not able to conduct an analysis; but managers could judge pretty nearly, because they could see when the combustion of the gases was taking place. If there was an excess of secondary air, they would notice discoloration in the combustion chamber. For a small gas-works, he found a regenerative setting too sensitive. Any change in the atmosphere quickly had its effect on the furnace. He had therefore designed his setting to work as a small generator.

Discussion.

Mr. R. Bearup (Stawell) asked Mr. Bean if he could give any idea of the cost of such a setting as he had described.

Mr. Bean said he was not quite sure as to the price, as the Colonial Gas Association supplied the labour and material. He would get the price at a future date.

Mr. F. Tipper (Fitzroy) said it occurred to him that Mr. Bean might have supplemented his paper with some items especially useful to those who were making themselves acquainted with small gas-fired furnaces. For instance, he should like to know the dimensions of the furnace, what area of damper Mr. Bean found gave the best results, how often the furnace was clinkered and filled, and whether with hot or cold coke. He would be glad to know the total area in square inches of the primary-air and the secondary-air supply that the author found necessary. With regard to the life of the furnace, Mr. Bean said it had been built for about seven years; and he further stated that its actual working life was 2150 days, or 40 days less than six years. It did not follow that the actual time the setting had been built should determine its life; one had to take into consideration the amount of work performed. If they went into the matter, they would find that Mr. Bean's furnace had consumed during its life something like 750 tons of coke, and had borne the wear and tear this brought about. The average furnace in most works would in this period have consumed something like 2000 tons of coke. With regard to the gas produced, he understood that the figures given in the paper did not represent the corrected make. This was to be regretted, because it was very necessary that the figures placed before a meeting like the present should be beyond cavil. The figures should be corrected to standard temperature; and then they might be accepted as reliable. In stating the yield of gas per ton, he thought it was also necessary to give the candle power, as the two went hand in hand. With regard to the coke made for sale, of course it was usually understood that with intermittent working the maximum amount of coke could not be produced, and therefore they could not expect to sell so much with a bed only partly working as when in continuous use. Still, a period was mentioned by Mr. Bean when his bed was fairly well employed; the working being equal then to 2½ cwt. charges every six hours. During this period, the yield of coke for sale they were informed was 8·13 cwt. This was by no means a very high result for this particular time; and it was due to the absence of what Mr. Bean termed the regenerative portion of the bed. It was impossible for managers to derive full benefit from these settings unless they could recover some of the heat going up the stack; and it was only by making the very best use of the waste heat to heat the secondary air admitted to the bed that the best results were obtained. Had the setting been so designed by Mr. Bean, he would, in the period mentioned, have been able to sell much more coke than 8 cwt. per ton of coal. The importance of the coke for sale was apparent when he reminded members that if Mr. Bean had been able to raise the quantity of coke by 1 cwt. per ton it would have been worth £120 more in seven years. With regard to the quantity of coal carbonized per retort which Mr. Benn managed to get—14 cwt., or 42 cwt. for the bed for 24 hours—he should like members to note this result particularly. It was a very good performance—probably a record—as it represented something like 174 lbs. of coal per foot run of retort per 24 hours; and in the very best horizontal practice, with mechanical working, the results were only 140 lbs. He should like to know whether this was what one might call a "spurt," or whether it could be continued indefinitely. Of course, if the former was the case, it was not worth mentioning. They only wanted to hear of something that could be carried out continuously and practically. The point as to the length of time the producer would go without requiring attention would more than repay any extra cost incurred in putting in the setting. It was a very great blessing to any manager to be able to leave the works for six or seven hours without having to rush back or send a man to look after things. Mr. Bean had said that no closing of dampers was required. He (Mr. Tipper) could hardly see why. It appeared to him that the small setting described was well adapted to stand the closing of dampers without any considerable reduction of heat such as took place in a direct-fired furnace. Another great point about these small beds was the excellent manner in which they worked when required as direct-fired beds. There was a period, as they all knew, when the coke in a furnace fell below what might be termed the effective zone. At such times, the bed became a direct-fired furnace. Small beds adapted themselves admirably to this way of working, as they could work either way. Another point in the paper he would like members to notice was the cutting-away of the brickwork in order to get at the clinker which formed on the front wall. He thought it was bad practice. The clinker formed there owing to the air slipping up the front of the drip-plates through want of packing. It went up the front wall instead of going through the fuel. He was inclined to think that by cutting the wall away it would simply make it easier for the air to flow in that direction, and cause more clinker to form. It was questionable whether it would not be better to make provision for the prevention of clinker than for its removal. In the construction of these little settings, he thought it was quite unnecessary to provide expensive fittings—such as doors, slides, &c.—as they were not needful to the proper working of the bed. He should like Mr. Bean to say whether the arch over the producer was necessary in so small a setting as the one he had described, or whether he thought a producer in a small setting with no great depth would not work as well without the arch. He (Mr. Tipper) personally regarded the arch in any small setting as by no means necessary. In some small settings which had no great depth, he would suggest that the arch should be left out on the score of economy in cost.

Mr. L. Rodgers (Warrnambool) said he would like to make a few remarks in favour of regenerative settings. He had a setting of five semi-regenerative English retorts, which had been working almost seven years; and the results obtained were as follows: The first charge was put in on Jan. 1, 1903; and the coal carbonized up to Sept. 30 last was 5491 tons. The gas made (the figures not being corrected for temperature) was 57,680,000 cubic feet—an average of more than 10,500 cubic feet per ton for the whole period. During the preceding twelve months the coal carbonized was 835 tons; and the gas made 8,749,600 cubic feet—the average per ton being 10,478 cubic feet. The best month's work ever accomplished by this setting was in May, 1908, when 81 tons 16 cwt. of coal were carbonized, yielding 87,760 cubic feet of gas—being an average of 10,513 cubic feet per ton. But the best average make per month was in October, 1908, when 75,880 cubic feet of gas were produced, or an average of 10,650 cubic feet per ton of coal, which was Hetton, about half slack. In 24 hours they made 32,000 cubic feet of gas with five retorts, using 2 tons 19 cwt. of coal; the make per mouthpiece being 6400 cubic feet. This could have been continued for about a week without damaging anything. He clinkered once in 24 hours. He found the semi-regenerator very easily regulated; it gave a regular heat, even on the bottoms of the retorts, and was no trouble whatever. They sold about 8 cwt. of coke per ton of coal carbonized; this result being obtained regularly.

Mr. Tipper asked to be allowed to supplement his remarks. In speaking of the life of the retorts which Mr. Bean had mentioned, he would point out that in 2½ years they had carbonized something like 19 tons per foot run of retort. The average retort would have carbonized 55 tons per foot run.

Mr. E. Tipper (Box Hill) said, in his opinion, Mr. Bean had been working his furnace with intelligence and ability. He (the speaker) had to strive hard to get anything over 11,000 cubic feet per ton; and he could not sell more coke than Mr. Bean. On the question of the amount of coke sold, he should like to ask Mr. Bean if he included breeze, and the coke-breeze and dust, and the whole of the residuals not used in the furnace. He should also like to ask him if he had ever tried heavy charges in his small retorts. He himself had been trying some 4 cwt. charges in retorts of the same size, thinking he would get better heats and more gas; but he found that the make per ton was slightly lower and the heats rather more difficult to maintain. Perhaps, however, this was because he had not carried on the experiment long enough, although it had been going for three weeks.

Mr. Barson (Broken Hill, N.S.W.) said he should like to bear testimony to the results obtainable with the kind of settings under discussion. During the last 4½ years he had used a similar furnace to the one described in conjunction with a bed of fives. His retorts were 23-inch by 16-inch and 10 feet long. During the winter, this bed had been in use week after week—the top retorts with 4½-cwt. and the bottom ones with 4¼-cwt. charges. They had eight retorts and got from 64,000 to 65,000 cubic feet of gas per day. The lower retorts in the bed of fives would only take 3¼-cwt. and 3½-cwt. six-hour charges. He had just fitted up another bed of fives, and let down the old one after working it for 4 or 4½ years, and the retorts had been renewed. It was really a setting of three retorts in the same sized arch as the bed of fives had been built in; but the two lower retorts were left out, and the space was used for recuperation. He thought, with Mr. Tipper, that if they could get the air heated by the waste gases they would gain. He generated all his steam by the waste heat from the retorts.

Mr. W. Swinburne (Melbourne) said he had doubts at one time whether what Mr. Bean had described would apply to small works; but he had since come to the conclusion that his installation was of more importance to these than to large ones. Theoretically speaking, regeneration was, of course, the proper principle; but in practice it did not always work well. He had put

regenerator systems into very small works, but had found that the sensitive nature of the settings, and the degree of attention required from the manager, had conduced to make them not always successful. A similar setting to Mr. Bean's, on the separate generator system, was the best for small works. With regard to the cost of a setting of this nature, he might tell Mr. Bearup, though he had not the figures with him, that, including retorts, fire-bricks, and labour, it would be from £100 to £110.

Mr. A. G. Ambrose (Bathurst, N.S.W.) said he had had experience of both generator and regenerative furnaces, and when he reset his furnaces he should keep to the generator type, as he did not think that in works of the capacity of those at Bathurst the putting in of a regenerative furnace was worth the trouble it entailed. The generators were easily manipulated; and he was going to get as good results from these furnaces as from regenerators. The charges per retort were about 4 cwt., put in every six hours; and the retorts were 21-inch by 15-inch and 9 ft. 6 in. long. The coal used contained 13½ per cent. of ash; so that they had to clinker every six hours. The clinker was not of the ordinary kind, but a short, friable ash; and they had to use steam to remove it. The steam made the clinker rotten, and practically the whole of it could be knocked off with a walking-stick. With regard to the construction of the setting, the secret was to have the producers deep and wide enough. His were 2 feet deep and 3 feet wide; the fire-bars were 5 feet long; and the length from the top of the arch to the clinkering-box was 7 feet. The producer sloped out; it was a kind of pear-shape, and held a great quantity of coke. He found the first setting he erected heated the back of the retorts; but after he made the producer of the shape mentioned, he got a uniform heat from the front to the back. He could not too strongly recommend the adoption of a system of setting similar to that described by Mr. Bean, even if there was only one retort. Judging from his own experience, he did not think it would cost quite so much to instal as Mr. Swinburne had stated. The difference between a direct-fired and a generator furnace was about £25, which included mountings, English fire-bricks, and excavation.

Mr. S. E. Figgis (Ballarat) said he had had long experience of regenerative furnaces, having used them solely for the last twenty years; and he should like to traverse some of the statements made by Mr. F. Tipper. He quite agreed with him in saying that the cutting-away of the front wall simply gave an opportunity for the air to go up into the wrong portion of the furnace; and he preferred to protect the furnace from the front of the setting. He must, however, disagree with him when he said that the producer arch was put into Mr. Bean's furnace simply for constructional purposes. He believed that if Mr. Bean were to do away with the arch he would certainly not get the results he did. One of the reasons for regenerative or generator firing was the proper mixture of the primary and the secondary air. If they did away with the arch, he did not see how they could get this proper mixture. Their sole aim should be to get thorough combustion at the nostril holes. He had heard a great deal about very strong heats, and thought it was quite possible to have too much heat in generator furnaces. As they got to a certain point, they would find that the attention required by the ascension-pipes and hydraulic main became excessive. He had seen for weeks together 5 cwt. of coal burnt off absolutely in a retort 9 ft. 6 in. long; but they could not continue this heat without giving great trouble in the retort-house.

Mr. J. Bowman (Sale) said he had put in regenerative settings using 22 in. by 14 in. retorts 9 ft. 6 in. long in a bench of six; but he found the bench required a great deal of attention. He thought that, on the whole, what Mr. Swinburne had said was true—viz., that generator furnaces were better than regenerators for small works. His furnace projected 14 inches from the front of the bench—similar to that to be seen at South Melbourne; so that the fire could be fed from the front. He had some trouble, as most managers had, through the heat having a tendency to take a short cut up the brickwork. There was a main door below the furnace-bars. When the furnace was being built, he brought in a 2½ course of brickwork on either side, and fitted in two lots of cast-iron doors, setting on three V-shaped bars loosely. The result was that the steam generated in the pit had no chance of working up that way. It could not possibly get in; and it, of course, went elsewhere. The doors were easily lifted out by the stoker. He had a great deal of trouble through short-circuiting with a small generator furnace; but, as a result of increasing the brickwork in various parts, the secondary air did not get heated to the same extent that it should, so he must have overdone it. He would strongly recommend the manager of small works to keep to the generator type of furnace; the regenerator being more adapted for works of large size.

Mr. J. W. Bean, in replying to the discussion, said he had no set rule about the opening of dampers. He opened them to suit the working of each particular setting he was using. At the present time, the opening of the flue was 1½ in. by 12 in.

Mr. F. Tipper: That is an area of 18 inches.

Mr. Bean (continuing) said that on a similar setting in the Old Country he had worked with ¾ inch. As to firing, he did it as often as possible with hot coke, but used cold coke for two charges per day. He certainly recommended the use of hot coke in the furnace. With regard to the air-flues, the same answer applied as to the damper. The area of the opening was 6 in. by 4 in., but was worked with an area of 1½ in. by 4 in.; the primary air opening being just under 1 in. by 4 in. As to the life of the furnace, he had not had a chance of judging, having only been in the State eight years. It had been in actual use under fire for 2150 days, and he had not had to reline it. The greatest trouble he had with it was through cheap firing-doors. Mr. Tipper had asked about ironwork. He did not think the door which cost the least money was the cheapest. For instance, they had two sets of doors on the furnace in three years, and each of the doors cost £1 15s. He designed a door which he thought would suit, and it had been in constant use for upwards of 200 days. To all appearance it would last twenty years; so he thought it was far better to spend an extra pound on a good door than try to save money by using an inferior article. Firing-doors that were not good buckled, or else the door-frame gave way, and the air found its way into the upper part of the arch, which not only affected the illuminating power of the gas, but also tended to injure the arch. With regard to the correction for temperature, he explained that he was not in a position to correct the make, and could not see his way clear to do so. As a guide, however, he had given them the quantity of gas he sold per ton of coal; and as he had to account for his gas, the figures could not be very far out. He might mention also that he had no means of testing the gas for candle power. All he could say on this point was that all his consumers were satisfied with their lighting; and he had no trouble either with gas-stoves or gas-engines. With regard to coke, he had given the weight; and this was the best he could do. In reference to generators as compared with regenerators, his experience showed that for his work it was preferable to use a generator, because its operation was more regular; and he contended that with a bed of three retorts he could get a larger quantity of gas per annum than with one of four retorts on the regenerative principle. But when it came to a bed of six or eight, the regenerator seemed to work differently. He would certainly, if putting in a larger setting, or one or two beds side by side, prefer the regenerator. As to the arch, he did not know how he should concentrate the gas sufficiently to bring it in proper contact with the secondary air if he did away with it. The primary gas had to be brought in a certain volume to meet the secondary air; and if the gas were brought lazily to meet the air, he questioned whether the combustion would be satisfactory. As to the life of the retorts, he had mentioned that his had been in use for 911 days. They were not yet done for, and he could not tell when they would be; but he hoped they would last another 911 days. As to the dampers, he did not quite follow Mr. Tipper about the necessity for closing them on small works. He had never tried the closing of them. As to the weight of the charge, he found that the heavier charges were better for them than the lighter ones, as they got better coke, and, if anything, a better make, though he could not vouch for the latter. He would certainly recommend the use of the heavier charges in small works during the summer months, because when once the heavy charge was burnt off, it kept the heat up better in the setting than the lighter ones. They had sold every ounce of coke they made; and they did not make a very great deal of breeze. Mr. Figgis had mentioned about bringing the furnaces forward. He (Mr. Bean) fell in with this suggestion, and thought it would be an improvement. They clinkered the furnace, on an average, about once in ten days. They cleaned the fire just before the last charge went in each night; and though they had used the present furnaces for seven years, he had never found it necessary to have the clinkering-bars repaired, and had not had to renew the spears. With regard to the ascension-pipes, he might say that, of course, there was generally a little trouble with stoppages; but he had not had any since he inserted screens.

The President (Mr. P. C. Holmes Hunt) said he thought the members were very much indebted to Mr. Bean for his paper, and for the lucid manner in which he had replied to the points raised upon it.

VALUABLE ADJUNCTS TO CARBONIZING PLANT.

By A. G. Ambrose, of Bathurst (N.S.W.).

[A Paper read before the Victorian Gas Managers' Association.]

The object of this short paper is to prove that, even in the smaller works, it is possible, without any large expenditure, to considerably augment the yield of gas per ton of coal carbonized, and that without loss of illuminating power.

When I took charge of the Bathurst Corporation Gas-Works, in February, 1906, the retort-house consisted of a bench of six settings of six retorts in a bed, 21 in. by 15 in. ⏢ section, 9 ft. 6 in. long, heated by regenerative furnaces, and with the hydraulic main, which was one of continuous length without division-plates, resting on the brickwork of the setting, with the natural result that the unequal expansion of the brickwork had considerably altered the seals of the dip-pipes, which, instead of being at one uniform seal, had ½-inch seal at one end and 3 inches seal at the other—or a difference of 2½ inches in the length of the hydraulic. During the winter of 1906, it required all the six beds, or 36 retorts, to cope with the demand.

The following year, we erected an entirely new retort-house, containing a bench of four ovens of seven retorts, 21 in. by 15 in. ⏢ section, 9 ft. 6 in. long, heated by regenerative furnaces. The four ovens had four separate hydraulic mains; and to these were afterwards attached the two valuable adjuncts which are the

subject of this paper—viz., a retort-house governor and a tar-tower. During the past winter, these furnaces only were under fire, though nearly 6 million cubic feet more gas was made than in 1906, when 36 retorts were in commission.

As already mentioned, to each of the four settings in the new retort-house there is a separate hydraulic main, quadrant-shaped, carried by the cross girders connecting the buckstays. Iron saddles carry the 9-inch foul main, to which the hydraulic is also connected by internal screw gas-valves. Each section of hydraulic is also connected by a valve at the bottom to a 4-inch take-off tar-main, which, in turn, is coupled up to the tar-tower at the end of the retort-house. The top of the tower is connected by a 1¼-inch equilibrium pipe to the foul main; and this ensures the pressure or vacuum, as the case may be, being the same in the column or tower as in the hydraulic main. Attached to the tower at the seal-level is an adjustable overflow-valve, which regulates the amount of seal decided upon on the dip-pipes. At the base of the column there is a valve, by means of which the tar is run off into the tar-well. The tar deposited in the hydraulic main immediately gravitates to the bottom through the open valves into the 4-inch tar take-off pipe, and thence into the tar-tower. Every eight hours, or at the change of the shift, the tar deposited in the tower is run off into the tar-well, liquor from an overhead tank replacing the tar; the liquor simply being turned off when it shows at the overflow-valve. Town water, of course, would do equally as well for the purpose required; but, as we produce both sulphate of ammonia and concentrated ammonia, the town water would dilute the crude ammoniacal liquor too much.

When the retort-house governor was fixed on the foul main, it was found that the vacuum was so steadily maintained, and the illuminating power of the gas so uniformly constant, that the seals in the hydraulic mains could be reduced with perfect safety; so that we are now working with a seal of 3-10ths and a steady vacuum of 2-10ths. We find that a vacuum of 4 or 5 inches at the outlet of the governor gives the steadiest gauge, though for experimental purposes we have had to pull as high as 20 inches, and still maintained a steady gauge of 2-10ths on the hydraulic main, as before.

I will briefly summarize some of the advantages claimed by the adoption of these additions:

Working under old conditions, the make of gas per ton was 9577 cubic feet. Now the make is 10,713 cubic feet, or an increase of 1136 cubic feet.

On account of a steady gauge, the deposit of carbon in the retorts is greatly reduced.

The gas produced is of a more uniform quality than before.

Remarkable absence of naphthalene.

In conclusion, I may state that no claim is made to the originality of the methods adopted, as described in this paper. They are merely the result of a diligent study of the "Transactions" of the various Gas Associations, as reported in the Gas Journals.

Discussion.

Mr. AMBROSE said he wished to supplement his paper by a few remarks. As mentioned, the real trouble he had was tar-seals The reason of the tar thickening in the hydraulic mains was not due, as some people thought, to the radiant heat from the settings, but was caused by the hot gas from the retort passing through the tar and distilling or evaporating the light oils. If one had a liquor seal, nothing of the kind would happen. Since he had put in the arrangement described, they had had no trouble with the tar; and only a few weeks ago he had had an end plate of one of the sections of hydraulic main opened for inspection, and found the inside as clean as when first brought into commission. The cost of the whole installation, including valves and retort-house governor, was only £27 10s. The retort-house governor was "home made," and was manufactured from the scrap-heap. It was an adaptation of the Charles Hunt equilibrium gas-governor, which, for simplicity and sensitiveness could not, in his opinion, be improved on. Having no available room in the retort-house for the tar-tower, they had to erect it outside. At Bathurst, they had very cold and severe winters at times; and he was afraid the tar in the tower would become too thick to run off. Therefore a steam-pipe was fixed, in order that the tar could be made quite fluid at will. So far, however, the aid of steam had not been required. The tar-tower was simply made out of a 12-inch pipe. Coming to the statement in the paper as to the remarkable absence of naphthalene, the whole of the naphthalene gas must of necessity pass up the ascension-pipes, where the greater portion was absorbed by the hot-tar vapour; and this, on being deposited in the hydraulic main, was at once removed with the tar into the tar-tower. Under old conditions—with the hydraulic main full of tar to the overflow-level—the only means of removing the naphthalene was by way of the foul main. The tar as it cooled down gave up part of the naphthalene it had absorbed while hot, as the tension of the naphthalene vapour was so greatly affected by difference in temperature. Then, again, the ammoniacal liquor in the hydraulic main absorbed phenol from the tar vapour; the phenol, in turn, having a well-known power for absorbing naphthalene. He was now finding naphthalene in the liquor concentrator. Where sulphate was manufactured, the heat of the saturator would drive off any phenol present in the ammoniacal liquor; but in Bathurst the liquor was concentrated to about 85 oz. strength, and they found an oil floating on the top which, when cooled, showed a large crystallization of naphthalene.

Mr. M. ALLAN (Hobart, Tasmania) stated that he had tar-towers worked on similar lines to Mr. Ambrose's, and also a Cowan retort-house governor. He could testify to their great usefulness, though if they were improperly attended to, they were liable to give considerable trouble. However, he was able to get on the average 12,000 cubic feet of gas per ton from Pelaw Main coal; and this result he partly attributed to the use of the tar-towers and the governor. The towers were 18-inch pipes 12 feet long.

Mr. E. TIPPER (Box Hill) said that, dealing with the two portions of the plant under consideration, he thought they were all pretty well agreed as to the advisability of having them. He had recently put up a couple of tar-towers in conjunction with two separate sections of a retort-house, on very similar lines to the one erected by Mr. Ambrose. All that had to be purchased was two portions of 12-inch pipe; the rest being provided on the works. The Cowan governor was very helpful as an addition to the tar-tower, as it prevented any pulling, and enabled one to get the seal down to a much finer margin, though personally he would not care to go down below a ¾-inch or ½-inch seal. By his gauge, he got 1-10th of back-pressure. In constructing a tar-column, he thought it advisable to so make it that any man on the works who might manipulate any of the valves would find it impossible to open the column to the atmosphere. If they took the tar off from the bottom of the tower without any sealing, and the valve happened to be open, they would not only open the hydraulics and run away all the liquid, but would at once throw the pull into the atmosphere. In handling the tar, he had a compensating supply. He had a trial-tap level with the hydraulic; and until he found the tar at this level, there was no necessity to run it off. There was no doubt a lot of advantage to be gained by keeping the hydraulic free from tar. He had a 6-inch pipe in use for a tar-column, and had never had any trouble with it. One had to be careful to put the column in a warm place—if possible, inside the retort-house. But if they were forced to put it outside, it would pay better perhaps to get a little larger pipe.

Mr. E. RABBIDGE (Invercargill, New Zealand) said he had done something similar to what had been accomplished at Bathurst. When he took over the works at Invercargill, he had the same trouble, as the hydraulics always got off the level, and there were no means of keeping the seal regular. In the new works, he had altered this—practically following the same lines as Mr. Ambrose. They had a tar-column of similar construction, and ran it off into one of the condenser-dips. Of course, the size of the column should be proportionate to the size of the plant. In a small works in which he was, situated in the north island of New Zealand, he made a tar-column of a 6-inch pipe, and stood it alongside the condensers. Retort-house governors seemed to be generally regarded as advisable; but when designing the new works he was now in, he could find no one who had had any experience of them, so he decided not to instal one. They had Bryan Donkin exhausters in duplicate, and paid great attention to the exhauster compensators. They never had any variation in the quality of the gas, and there were no complaints. He was not going to contend that a retort-house governor was not necessary. One could no doubt work with a smaller margin of seal with a retort-house governor close at hand; but the results that he obtained were very satisfactory, and he had not heard sufficient yet to make him decide to go in for one. Even in the smallest works, a man should put in a tar-column. When these were in use, it was no trouble to keep the hydraulic main free from tar.

Mr. N. KENNEDY (South Melbourne) said that at the works where he was stationed, there were two retort-house governors. The pressure in the ascension-pipe was about 2-10ths when the retort was first charged; and when the charge was completely carbonized, the gauge stood perfectly level. He would like to know whether Mr. Ambrose had any fluctuation in the pressure on the ascensions.

Mr. AMBROSE said he could not exactly tell that, as he had not got a pressure-gauge on the ascension-pipes.

Mr. C. W. HOWLETT (South Melbourne) said that at their works Cowan governors were used; and since they had been put on the bench, it had been much easier to regulate the make of gas. There was no doubt that tar-towers were also very useful. There was difficulty in getting a sufficient fall to the syphon sometimes, and in maintaining a regular seal. They had overcome these difficulties; and, with the addition of the governors, the pull was more easily controlled. They also had a better chance of keeping the gas at regular candle power. There was no doubt it would be a very great advantage for the smallest works to have these fittings.

Mr. HUNGERFORD (Dunedin, New Zealand) remarked that the tar-towers he was using were about three years old; and they were put to three settings of retorts. In regard to the size of tar-towers and tar-mains, he thought it very hard to get any guide. He could instance a case in Dunedin. In one installation of old direct-fired beds, they never had a stopped pipe in two years; but there was very little improvement when they came to work the regenerators, which was due to dust getting into the hydraulics. The area, size, and shape of the hydraulic mains had a lot to do with the efficiency of the tar-columns. He first had experience with round mains about 20 inches diameter; and there was too much room between the bottom of the dips and the bottom of

the hydraulic. In the new installation, there was only 6 inches between these points. In the tar-main was placed a rod working through a stuffing-box with a heavy washer on the bottom. This rod was worked right up and down occasionally. The system he adopted in Dunedin was to run the columns off every eight hours; and they were then filled up. Previous to that, it was customary to go to the columns every hour or two and run a little of the tar off. At one time they ran a ¾-inch steam-pipe right through the tar-main. Every morning a man would shut off all the tar-valves on one side excepting one, and then turn on the steam. As to retort-house governors, he did not think anyone would say that there could be a better system of working than could be obtained by using them; but there were nevertheless many things that could be said in favour of leaving them out in working a small place. It was customary in New Zealand to work with a pull up to 2 inches, and slacken the exhauster to 1 inch at charging time. A very good pull could be obtained by governing the exhausters. Retort-house governors, of course, rendered the retort-house independent of neglect in the exhauster-house; and, further, they maintained a uniform condition of things that was more conducive to efficient work in the retort-house. He was using local coal, and a very good gas coal; but it was harder to carbonize, and required higher heats. They were more liable when using it to hydraulic main troubles than was the case with New South Wales coal. New Zealand coal was being used in Dunedin when they had trouble with the tar.

Mr. Barson (Broken Hill) referring to pressure, asked whether Mr. Ambrose had 4 or 5 inches exhaust on the outlet.

Mr. Ambrose, in reply to the discussion, said that, as to fluctuation in the hydraulic main, it was barely half-a-tenth. He attributed this to the splendid work of the throttle-valve governor, which, in his opinion, was infinitely superior to the parabolic of Cowan's governors. It stood to reason that, having a "couple," equilibrium was more readily established. As to what Mr. Barson had said, he (Mr. Ambrose) was afraid he had been misunderstood. His gauge-glass was fixed, not on the exhauster but on the outlet of the governor; and then it showed an average of 4 inches exhaust, though it sometimes ran up to 6 inches. It depended entirely on the steam pressure in the boiler. To overcome this, a pressure-reducing valve was put on, set to 45 lbs., by means of which a very steady steam pressure was maintained. Though the pull at the exhauster might vary an inch or so, it made practically no difference on the gauge set between the governor and the hydraulic main; and even when the pull was as high as 20 inches, the gauge on the hydraulic main was uniformly maintained. Regarding the query as to the quality of the coal, it was all practically the same, and came from the Lithgow district of New South Wales. The average yield had been taken over a whole year's carbonizing. They had a full coal-testing plant; and when contracts were advertised for, they tested the various coals. The coal he was now using gave a yield of 11,500 cubic feet of gas per ton; and they tested for illuminating power as well, which was usually about 16½ candles.

The President (Mr. P. C. Holmes Hunt) said he thought the discussion showed a general concensus of opinion that retort-house governors and tar-towers were certainly two very valuable adjuncts to a carbonizing plant. They evidently conduced very largely to Mr. Ambrose's peace of mind. With a tar-tower, one could certainly run with a smaller seal and less risk; and with this steady state of affairs, the unsealing of the dips should be an unknown condition. One secret in arranging the plant was to get as much fall as possible on the tar-mains. In the installation they had inspected at South Melbourne, the mains were arranged with 3 inches fall per bed. Mr. Ambrose had made a great success of his installation. He thought he was correct in saying that Mr. Ambrose sold the cheapest gas in Australia, and what he had described was evidently one of the ways that permitted him to do this. By the small expenditure of £27 odd, he had increased his make by about 1200 cubic feet per ton.

DIFFICULTIES IN COUNTRY GAS-WORKS.

By Thomas Foster, of Oakleigh.

[Extracts from a Paper read before the Victorian Gas Managers' Association.]

Before passing to the subject of my paper, I wish to state that I am not a trained gas man, like most of the members of the Association. My experience is somewhat unique; it is certainly limited in years, and very circumscribed in character. Therefore the subject-matter of my paper must be somewhat crude and limited. About sixteen years ago I accidentally dropped into a gas-works for the first time, and, after stoking and general labouring for six months, I was put in charge. Consequently, the difficulties met with were numerous and often perplexing; but I have managed to pull through without any serious mishap, and with, I think, a fair amount of success. Since becoming associated with so many "masters of the craft," I hope to be able to give a better account of myself in the future than in the past.

One of the greatest difficulties met with in a country gas-works is the difficulty of obtaining expert assistance and advice in cases of emergency. The onus of the whole thing falls, as a rule, on the manager; and this, of course, necessitates that he should be a man of many parts, and very resourceful at that.

The first difficulty I experienced arose from this cause: An eight-way valve connected with the purifiers had become unworkable on account of being allowed to remain in one position for a number of years. The tar and dirt had set hard in the parts, and the whole thing was glued together. I was informed that several pounds had been spent in employing men who professed to know something about machinery, but they failed to shift the valve. While labouring on the works, I had seen the manager, with two assistants, spend two days trying to move it, but without success. It was most inconvenient to have this valve out of use, as it meant the suspension of gas-making when the purifiers needed renewing; so I determined to try my hand at shifting it. I am pleased to say that my first experiment proved successful. I simply put a good upward strain on to the valve by means of an endless chain pulley, then kindled a small fire round the barrel, and in less than 15 minutes it jumped out, and has been working ever since. Last month I shifted a similar valve, which had become glued up in like manner, by the same process of heating the barrel.

Another difficulty experienced was occasioned by the small firing capacity of the furnaces then in use on the works. These furnaces required firing every two hours, which, of course, meant running to and fro from the works when engaged on any job outside. To remedy this waste of time, I fixed another door above the two small ones, and by this means was able to extend the time between the firings to four hours by putting in the furnace a greater quantity of fuel. At the same time, I adopted heavy charging, regulating the charges to come off every eight hours. This method of working the retort-house afforded better facilities for attending to outside duties, and also relieved us of the necessity of all-night work. I found that the consumption of coke was very considerable to keep up good heats all the time; so, in order to save fuel, I tried the hot-air principle on a small scale, and found it work very well indeed. I applied it by running two flues —one on each side of the furnace—under the two main flues from the back wall of the bench forward to the extreme front, back again, and then forward; delivering through the cheeks of the furnace just above the coke line. This process saved about 50 per cent. of fuel, and gave equally good results in carbonizing.

Another difficulty I met with was through the breaking of the main outlet-pipe of the holder, 5 feet below the water-line. The main flooded in a few minutes, and, consequently, left the town in darkness. I met this difficulty by making the inlet answer for both purposes, connecting the temporary supply with 4-inch galvanized iron down pipe, which answered admirably. To repair the broken pipe, I had to pump the water down below the break, and pull down the wall of the tank. The break extended all round the pipe, and about 3 inches in a longitudinal direction; but the pipe was not out of position. I treated the break in this way: I got a yard of canvas, 12 inches wide, and bound it tightly round the pipe with white lead, clipped it with a 12-inch clip, and then cased the whole 5 feet of pipe in cement concrete.

The instances I have named are a few of the difficulties met with in my short experience, and the methods adopted to deal with them.

Discussion.

The President (Mr. P. C. Holmes Hunt) said the paper was distinctly one which should call forth some interesting remarks.

Mr. Scoles (Ipswich, Queensland) said the paper recalled to his mind an experience he had about ten years ago. He arrived at the works just before Christmas, 1889. There was an exhauster, worked by a gas-engine of 3½ N.H.P. It had been fixed about twelve years before, and had run for about an hour. It would not work. Apart from that, they were getting about 6000 cubic feet of gas per ton of coal carbonized. The men had to fire-up every half-hour, and sometimes every quarter-of-an-hour. The retorts had been built above the top of the furnace to allow 6 or 8 inches of flue, and the heats were not retained. He got to work on the engine, and tried to find out where the service came from; and he found it was connected at the purifier. He then put the service on to the outlet to the town, and got good results. He could not do much to the benches for some time; but he effected some improvements, and soon raised the make of gas from 6000 to 9000 cubic feet per ton. After the benches were properly going, he made 10,000 cubic feet per ton. He was about to improve the whole thing, and put in regenerators.

Mr. A. Humphrey (Hamilton) remarked that very nearly every piece of machinery about a gas-works was bye-passed, and yet the inlets and outlets of the holders were not. He saw in one works that they had a bye-pass from the outlet to the inlet. When engaged in a small works, especially on Saturday nights, and standing on the edge of the gasholder wondering whether or not it was on the bottom, the need of such things came home to one. Mr. W. H. Kelly, who was many years ago in Melbourne, was at one time at Maryborough, in Queensland; and he remembered that at about a quarter to ten one night, when the consumption was greatest, he found that his holder was nearly grounded, and he could not get any gas through, owing to the inlet being blocked; the pipe for pumping the water out having split. Mr. Kelly put down a half-inch pipe to the pump, and in this way got over the trouble. At another time the inlet-pipe became choked with naphthalene very suddenly. They had enough gas to carry them through; but from that sent out there was some trouble with naphthalene, and consequently he had to put in a bye-pass. By this means, in cases of emergency, they

could still keep all the lights in the town burning; otherwise they would go out.

Mr. J. BOWMAN (Sale) said the accident Mr. Foster had with his gasholder was interesting, and must have been very exciting while it lasted. About 25 years ago, there were 2 inches of rainfall in an hour-and-a-half at Sale, and the water got into the holder. The stoker had put in a charge of coal; but the town lights went out. This happened in the middle of a Saturday night. They set to work on the syphon-pipe, and managed to get going again in about 20 minutes; but by the time the gas supply was restored, the people had closed their shops.

Mr. R. BEARUP (Stawell) said he could supplement what Mr. Bowman had said in regard to the flooding of the holder, as he was present on the occasion. As Mr. Humphrey had truly said, the trouble would have been avoided altogether if there had been a bye-pass. Before they were able to pump the water out of the inlet, they had to make a hole in the brickwork of the tank; and by the time this had been done, and the gas set going again, the people had, as Mr. Bowman said, closed their shops. A bye-pass going in at the outlet would have remedied the thing altogether. The difficulties which had to be met in country gas-works were very numerous; and they often cropped up very unexpectedly. With regard to the furnaces, he put in the upper door as mentioned in the paper, and could fill up and leave the works for half-a-day. After dinner he could put on the fire, and need not return again until five or six o'clock in the evening. During this time, he was free to do his collecting, &c.

Mr. KEMPSTER (Waratah, N.S.W.) said his works were somewhat antiquated; and he had had charge of them ever since they were started 21 years ago. One of his difficulties was that he was under the control of a Municipal Council. The councillors did not understand a great deal about the business, and there was always trouble in getting them to find the money with which to carry out any improvements. His greatest worry was that they were growing from a consumption point of view; but the gas-holder was not growing. It was 61 ft. 4 in. by 18 feet, and was very substantially constructed. It was in first-rate condition, and what he wanted was to put a lower lift on; the holder being originally constructed so that another lift might be added when required. Between the cutting and the edge of the brickwork of the tank, there was a space of about 22 inches. The proposition was to build the lower lift round the existing one first, and then lower it into position without interrupting the supply of gas.

Mr. J. LORD (Williamstown) said that about four years ago they had a telescopic holder, and whenever the lower lift was raised it was not level. One day he took the weights off one side, and put them on the other, and got the holder (which was full) fairly square. He then tried to test it by passing the gas from it into a second holder, which was nearly empty. He noticed the holder come down slowly for about 9 inches; but all at once he heard a bubble, and saw the inner lift drop suddenly, leaving the outer one jammed and hanging in the columns. It was a most alarming situation; and, of course, as was usually the case, it was a Saturday afternoon and very little gas was in stock. The plan he adopted for lowering the bottom lift was to fix timbers under the guide-wheels, and by shortening these 3 inches at a time he gradually lowered the lift into the tank. It was not long before he put the weights back again; and the holder had gone all right ever since. If the holder went crooked for another fifty years, so long as it acted correctly, he would not touch it again.

Mr. W. FROST (Mornington) said he remembered when at Portland having to be out pretty nearly all one night. Owing to the holder being very low, and the tide very high, he had to see that there was sufficient space for the water to pass out again. But the most serious thing that had happened to him during his thirty years' experience in gas-works was at Box Hill. They had had a very heavy storm, and the yard was flooded. He found the purifiers blowing—the storm water having filled the holder tank and flooded the inlet and outlet pipes. The water was flowing over the brickwork. He had to knock out a course of bricks very quickly; and during the time he remained at Box Hill he took good care not to put them back again.

The PRESIDENT, in closing the discussion, remarked that, in regard to the point raised by Mr. Humphrey, he did not think there was any reason why there should not be a bye-pass between the inlet and outlet of a gasholder; and at times it would be of use, more particularly in small works. He would suggest to Mr. Kempster that he should put one on his holder, if he had not done so already; for if he determined to carry out his proposition—which was characterized by a certain amount of boldness—he might find it very helpful.

Mr. FOSTER said he did not think there was anything to reply to; and therefore he would simply thank the members for the remarks which had been brought out by his paper.

Alderman Robert Gibson, the Chairman of the Gas Committee of the Manchester City Council, last Friday completed his 78th year, and was the recipient of hearty congratulations from his many friends.

The death occurred on Monday last week, at the age of 50, of Mr. "Pete" Curran, the general organizer of the Gas Workers and General Labourers' Union. He was President of the General Federation of Trades Unions, and for some time represented the Jarrow Division in Parliament. He was, however, defeated at the recent General Election by a majority of 67.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Flow of Gas Through Pipes.

SIR,—Mr. Chandler's article on the above subject in the "JOURNAL" for the 8th inst. is most interesting. Having been accustomed to using Dr. Pole's formula when determining the size of mains or services necessary to supply a certain quantity of gas with a minimum loss of pressure, and so often finding the actual flow to be greater than that given by Dr. Pole's formula, I was much surprised to read the results of Mr. Chandler's tests. My figures, being mostly obtained from rough tests, are suitable only for the practical purposes for which they were originally intended; but I venture to give in tabular form a few practical tests which I have corrected for temperature and pressure and aqueous vapour, and to which I have added some results obtained in a similar manner, but with the terminal end of the pipe open to the atmosphere, and the corresponding figures calculated from Dr. Pole's formula. From this, it will be seen that, for practical purposes, the old tables are sufficiently accurate, at least so far as ordinary service-pipes are concerned.

TABLE *Showing the Flow of Gas, in Cubic Feet per Hour, through 1-Inch Wrought-Iron Service-Pipe, 41⅓ Yards Long.*

Pipe Open to Atmosphere at Terminal End.				Pipe Partly Closed at Terminal End.				
		Flow.		Pressure.			Flow.	
Pressure in Tenths of an Inch.	Flow as Calculated by Dr. Pole's Formula.	Observed.	Correct'd for Temp. and Pressure.	Inlet.	Outlet.	Difference.	Observed.	Corrected.
1	105	75	77	14½ to	13½	1/10	96	99
2	149	115 124	144 156	..	..	..	..	..
3	182	149	187	40½ ,,	37½	3	162	203
4	208	160	200	30 ,,	26	4	172	215
5	232	181	227	21 ,,	16	5	182	227
6	255	205	256	..	..	..	..	..
7	270	226	282	42 ,,	35	7	232	290
8	295	257†	321†	36 ,,	28	8	243	304
9	314	242†	302†	30 ,,	21	9	259	323
17	429	360	450	..	..	..	..	..
2*	275	..	..	30 ,,	28	2	300	..

* 1¼-inch service 110 feet long. † These figures appear to be reversed.

Mr. Chandler suggests that the variation between his carefully-observed results and Dr. Pole's formula may be due to "viscosity" (if this be a correct term to use in reference to gases); and the tables which he gives, and the conditions under which the tests were made, do, I think, very strongly support this suggestion. If a pipe be open to the atmosphere at one end, and the whole of the pressure be converted into velocity, the effect of "viscosity" (or may we say eddying action due to skin-friction?) would be at its maximum. Then, again, the smaller the pipe the greater the effect of viscosity, because the surface is so large in proportion to its capacity. These seem to me to be the two conditions under which Mr. Chandler's tests were made: (1) Pipe open at one end to atmospheric pressure, and (2) pipes of very small diameter, so that the effect of viscosity would be most marked under these conditions.

In nearly all practical cases, the conditions are entirely different. The pressure is comparatively great and the velocity very low, and the sizes of pipes are very much larger; and, consequently, I venture to think that we may still use the old tables without fear of erring on the wrong side.

Would not this be a most useful subject to refer to the Special Purposes Committee of the Institution of Gas Engineers for further investigation?

Clevedon Gas-Works. Feb. 19, 1910. JOSEPH HARGER PYE.

"The Times" Controversy, Gas v. Electricity.

SIR,—I have read your notes on the controversy which has been going on in "The Times" as to the relative costs and advantages of electric lighting and gas lighting.

It is not the first time that I have been led to admire your paper; for it must be a valuable one to the gas industry. The consistency of your misrepresentations in the matter of the advantages and cost of gas lighting are worthy of a better cause. There is no doubt that your continual sticking to absurd statements must have some effect on the public who are lucky enough to get your paper.

As to the cost of electricity and gas, you will remember that months ago I cited some instances of relative cost—one case of which you looked into; and up to the present even your ingenuity has not supplied the solution to what is to you a mystery. Of course, in my own mind, there is no doubt that electricity at anything below 4½d. per unit is cheaper than gas; and this has been proved over and over again in my experience.

In saying cheaper, I again say, as I have said so many times before, that I am talking of practical conditions. Even I have doubts as to whether electricity at the prices mentioned can compete with gas at 2s. 8d. per 1000 cubic feet on the score of lighting cost, when the gas lighting is run under laboratory conditions. But the whole *crux* of the matter is that gas lighting is never run under laboratory conditions in practice.

Let me tell you of an instance that came to my knowledge, and which you can verify if you wish. In a big Public Institution in West Ham

(not owned by the Municipality), I quoted an estimated figure for the cost of electric lighting in place of gas. I was not aware of the amount of the gas bill, but estimated that also, on the basis of 5 to 5½ cubic feet per burner. When my quotation came before the Committee, one particular gas enthusiast on the Committee spoke for ten minutes on the absurdity of my statements regarding gas consumption per burner. When he had finished, the Secretary stated that he had also doubted the statements I had made; and, to elucidate the matter, he had had a number of the gas-burners tested, with the result that he found my estimate was absolutely correct.

Now these particular burners are the type which are so often cited by you as taking 3 to 3½ cubic feet of gas per hour, and giving 60-candle power. You will understand then what I mean when I say that electricity is cheaper than gas—both being run under practical conditions. You are probably aware that laboratory and practical conditions are identical so far as electric lighting is concerned.

Now with regard to the hygienic advantages of gas, I have never yet had from you an explanation as to why plants will not thrive and live in a gas-lighted room. Dealing with the public every day of my life, it is a most common occurrence to find this disadvantage of gas lighting quoted by consumers. Surely if your statements as to ventilation are correct, plants should be better off in a gas-lighted room than in an electrically lighted room; but, as you are well aware, for all you may say and write to the contrary, such is not the case.

Referring to gas heating, the same objections may be raised as regards gas lighting. It is no uncommon thing for people to come into our show-rooms and condemn gas heating on the score that it gives them bad headaches, makes them sleepy, and aggravates chest troubles. These people are the public for which electricity and gas suppliers both cater; and it is their opinion that really matters.

If I were given to prophecy, I would tell you that the competition the gas companies are beginning to feel in lighting, and which they would feel much more keenly had electricity supply the same admirable commercial organization as the gas supply, will extend to gas heating and gas cooking in the not very distant future.

H. H. Holmes, Sales Manager,
Borough of St. Marylebone Electric Supply.

York Place, W., Feb. 12, 1910.

[It is with profound regret that we see removal from West Ham to Marylebone has not improved the courtesy of our correspondent. He speaks of our "misrepresentations" and "absurd statements." He cannot object to our appropriation and application of the eloquent terms as being admirably fitted to his own frequent epistolary work. We have asked him on more than one occasion to put the matters of what is possible with gas lighting, and what is impossible with the best forms of electric lighting, for domestic use to positive test, but he carefully and silently slips away through the back door, and the action and silence speak volumes. It is true he has in the past cited some instances of relative cost; and so has Mr. Hanbury Thomas. It is equally true that Mr. Holmes has given us no categorical statement as to hours of use and illuminating power obtained, nor has he been able, except by guesswork, to discriminate between the quantities of gas respectively used for lighting and cooking. Gas companies and local authority gas departments all over the country can quote instances of modern gas lighting having evicted electric lighting, to the financial benefit of the consumer. Mr. H. N. Clark, in his Southern Association paper, mentioned what had been done in this way at West Ham; Mr. Holmes does not controvert those published assertions. Again, it is true that we asked Mr. Holmes, for the purpose of investigation, for the names and addresses of the consumers whose accounts he has quoted. He refused them; but gave us a single instance, in respect of which it was shown conclusively in our issue for June 15 last that the consumer could not have been getting (if he was using proper incandescent gas-burners) the same illuminating power from his electric lamps that it was possible for him to obtain from the quantity of gas that he consumed. Constant reticence and shuffling are all that can be secured from electricians who venture into controversy on these points. The illuminating value that can be realized by us from such an uncomplicated thing as an incandescent gas-burner can be realized by anyone by running the burner under "practical" conditions. Conditions that are "practical" are those that "may be used in practice or applied in use;" and will Mr. Holmes tell us of any condition that is applied in testing photometrically and for consumption an incandescent gas-burner, that cannot be applied in ordinary use? We shall be interested in his reply. He speaks of a public institution in West Ham in which the burners were of the upright type, commonly consuming 3 to 3½ cubic feet an hour, and giving an illuminating power of 60 to 64 candles. These burners, he avers, were found (by what means, or by whom he keeps secret) to consume 5 to 5½ cubic feet an hour; but he does not say what illuminating power they were giving. Two cubic feet of gas per burner were wastefully used, if each burner was only giving 60 candles. We seem to remember asking Mr. Holmes on a previous occasion for a sample of burner to which he ascribed an extraordinary consumption, in order that we might test it. But no burner came to hand. We should like one of the burners from the public institution to ascertain the cause of the abnormal consumption. Perhaps Mr. Holmes can arrange to oblige us. In exchange for it, the public institution can be supplied with a burner of the type named that will not consume more than 3 to 3½ cubic feet an hour, and will give the illuminating power named, or if preferred an inverted incandescent burner giving 50 candles on a consumption of 2½ feet an hour. But taking the consumption of the burners referred to at 5 cubic feet, the Gas Company would have been very pleased to maintain them in a condition that would have given much more than 60 candles. Taking 60 candles, and Mr. Holmes's 5 feet, the efficiency was equal to 12 candles per cubic foot; so that 3d. of gas gave 1116 candle-hours, as against 800 candle-hours from a unit of electricity. And the same amount of gas used in modern burners would have given about 2400 candle-hours. Does Mr. Holmes deny this? If he does not, then the consumer has got to lose two-thirds of what is possible with gas—or 1600 candle-hours—before there is cost-equality on a light-for-light basis. Where is the "misrepresentation" or the "absurd statement" here? Real absurdity is found in electricians and sales managers building for themselves a Fool's Paradise as a suitable place for residence. What is more, it is a wrong thing for consumers to use exposed metallic filament lamps. Only their reflected light should be utilized; and reflected light is a costly means of illumination. For proof of which, read the testimony of electricians in the discussion on "Glare" published this week. Mr. Holmes complains that he has never yet had from us an explanation as to why plants will not thrive and live in a gas-lighted room. It is not within our recollection that he has ever asked for an explanation; and what is more, writing as we are doing in a gas-lighted room in which there are plants—the friends of years—we are not prepared to run contrary to the truth, and say they will not live and thrive in rooms so lighted. Mr. Holmes's studies seem not to extend to plant life; they have apparently been largely limited to consumers' accounts that show a "saving" on gas, and have not even extended to those that show the contrary. If treated properly, plants in a gas-lighted room should not die, but (if the assertions of electricians on another point are correct) they should improve in growth and strength. Carbonic acid is the principal source of the solid material of plants; but they must digest and assimilate it under the influence of sunlight. That is the whole secret. If a plant is placed away in the back part of a room where the sunlight cannot fall upon the chlorophyll in the leaves, its energy in performing its proper functions is depreciated, with the natural result—decline. There is a little elementary work by Grant Allen entitled "The Story of the Plants;" and in the chapter on "How Plants Eat," Mr. Holmes will find an answer to his inquiry. As to our correspondent's remarks about people going into the Marylebone electricity show-rooms and complaining of gas-heating causing bad headaches and sleepiness (bad headaches do not conduce to sleep), and aggravating chest troubles, of course there are such people, just as there are people who go into gas show-rooms, and complain of the stuffiness (and headaches thereby occasioned) of electrically lighted rooms, of the heaviness of electric lighting accounts, of the poor heating capacity of electric radiators, of their cost, of the frights consumers of electricity have received from wires fusing, of their annoyance from failures of the current, and so forth. Does Mr. Holmes deny that the Glasgow experiments published in our issue of Jan. 4 showed that the air of the rooms in which the trials were conducted was changed 5·2 times an hour through the use of the gas-fires (this would not happen with electric radiators); does he deny that the Gaslight and Coke Company have on their registers 1000 medical men in London who are themselves users of gas-fires; does he deny that last half year the *increase* in the number of gas-stoves let out on hire by the Gaslight and Coke Company was 35,153; and that there has been a perfect boom in gas-fires in the country this winter, so much so that certain gas-fire factories have had to work night and day to keep pace with the demand? True, as our correspondent says, it is the opinion of the people for whom electricity and gas suppliers both cater that really matters; and we are very pleased to see that their opinion produces such substantial figures for gas undertakings. Concerning the semi-prophecy in the last paragraph of the letter, with all deference to Mr. Holmes's prescient gift, we may say it has not caused us even a momentary flutter or a twinge of misgiving.—Ed. J.G L.]

Gas Supply for Liphook.—It was announced in the "Journal" some time ago that a Company had been formed, with a capital of £5000, in £10 shares, to supply gas in Liphook. It appears that the Company will be supplied with gas in bulk from the Woolmer and District Gas Company, who have power to purchase the Liphook Company's undertaking any time within seven years at 20 per cent. premium.

Gas Poisoning in a West-End Hotel.—A case of gas poisoning occurred last Saturday at Lock's Hotel, Bedford Street, Strand. At about three o'clock in the afternoon a constable reported at Charing Cross Hospital that a man was lying in a serious condition, and that prompt medical assistance was necessary. A doctor from the hospital went to the hotel, where in an upper room he found an elderly gentleman lying unconscious. An examination showed that he was suffering from the effects of gas poisoning. The man, who was conveyed to the hospital, where he remained for several hours in an unconscious condition, appears to have been staying at the hotel. His name is given as Mr. F. Williams, residing near Bristol. When he was found, the gas was turned on, but was not alight.

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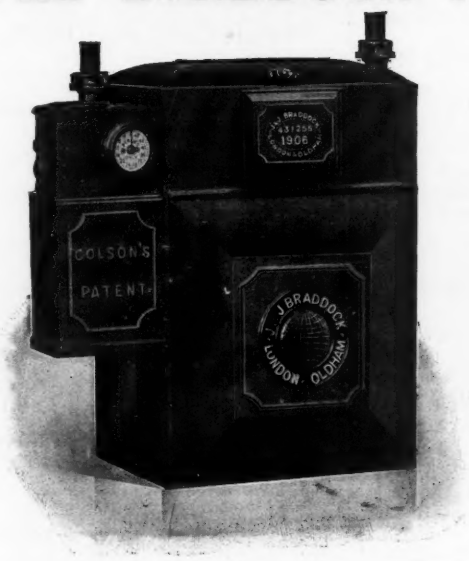

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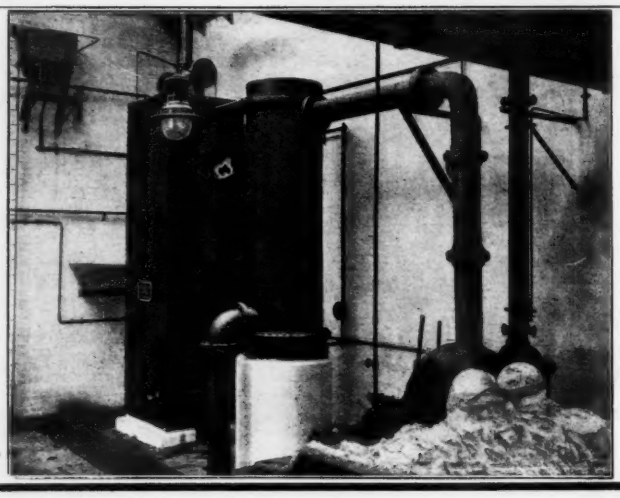

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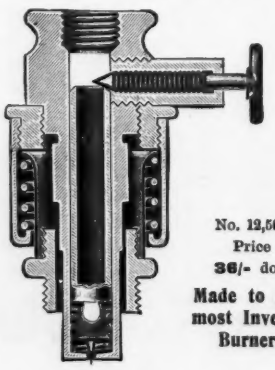

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PARLIAMENTARY INTELLIGENCE.

OPENING OF THE SESSION.

The Third Parliament of the present King was opened by Royal Commission last Tuesday afternoon; the State ceremony being performed yesterday by His Majesty, who was accompanied by the Queen, when, as customary, he read the Speech from the Throne.

The first business in the House of Commons was the election of a Speaker; and the Right Hon. James William Lowther, who had filled the position in the preceding Parliament, was unanimously chosen for the office.

The House was occupied until Thursday in swearing-in the members, and then adjourned till yesterday.

Petitions against Private Bills.

The following petitions have (among others) been presented against the Bills named :—

Brighton and Hove Gas Bill, by the East and West Sussex County Councils, the Brighton and Hove Corporations, the Portslade-by-Sea, Southwick, and Shoreham Urban District Councils.

Bristol Gas Bill, by the Bristol Corporation, the Bristol Tramways and Carriage Company, and the Staple Hill Land Company.

Chipping Norton Gas and Electricity Bill, by the Corporation of Chipping Norton.

East Grinstead Gas and Water Bill, by the East Sussex County Council, the East Grinstead Urban District Council, and inhabitants of Forest Row.

Egremont Urban District Council (Gas) Bill, by the Cleator Moor Urban District Council.

Kingswood Water Bill, by the Surrey County Council and the East Surrey and Sutton District Water Companies.

London County Council (General Powers) Bill, by the Gaslight and Coke Company and the Metropolitan Water Board.

London County Council (Tramways and Improvements) Bill, by the Gaslight and Coke Company and the Metropolitan Water Board.

Mallow Gas Bill, by the Mallow Urban District Council.

Mallow Urban District Gas Bill, by the New Mallow Gas Company.

Mountain Ash Water Bill, by the Breconshire County Council, the Aberdare Urban District Council, and the Neath Rural District Council.

Pontypridd and Rhondda Joint Water Board Bill, by the Cardiff Corporation, the Barry and Caerphilly Urban District Councils, and the Llandaff, Dinas Powis, Llantrisant, Llantwit Fadre, and Neath Rural District Councils.

Pontypridd Water Bill, by the Barry Urban District Council and the Neath Rural District Council.

Shirebrook and District Gas Bill, by the Derbyshire and Nottinghamshire County Councils, the Mansfield Corporation, and the Warsop Urban District Council.

Slough Water Bill, by the Conservators of the River Thames, the Middlesex and Buckingham County Councils, the Slough Urban District Council, the Eton Rural District Council, and the Rickmansworth and Uxbridge Valley Water Company.

South Hants Water Bill, by the Southampton Corporation and the Winchester Water and Gas Company.

Staffordshire Potteries Water Bill, by the Staffordshire County Council, the Burslem, Fenton, Hanley, Longton, Newcastle-under-Lyme, and Stoke-upon-Trent Corporations, the Tunstall Urban District Council, and the Stone Rural District Council.

Tipperary Gas Bill, by the Tipperary Urban District Council.

Whitland Water and Gas Bill, by the Narberth and Whitland Rural District Councils.

Worksop Urban District Council Bill, by the Lincoln Corporation and the Worksop Water Company.

Coal *v.* Coke for Pumping Water.

At a recent meeting of the Ryde Town Council, the Water Committee submitted a report in which they recommended the purchase of 700 chaldrons of coke from the Ryde Gas Company for steam-raising purposes. Mr. Weeks said it was no doubt within the recollection of the Council that a test had been made to ascertain the relative values of coal and coke. It was then said by the Resident Manager (Mr. J. T. Harvey) in his report that there was a direct saving of 13s. 2¾d. per million gallons of water pumped by using coke instead of coal. This amounted to a saving of £3 1s. 6½d. per week. The Water Committee did not care whether coke or coal was used, so long as they employed what they considered to be the best fuel at the lowest cost. If there was to be a saving of £3 per week by using coke, he thought it would be criminal on the part of the Committee not to employ it. The recommendation gave rise to a long discussion, in the course of which Mr. Barton said he knew of no water-works save those at Newport and Ryde in which coke was used in preference to coal; and the Council would be going a very long way back if they preferred coke, which was only the refuse from coal. Nobody looking at the question with an unbiased mind would say that coal with the gas extracted was better than it was before. Mr. Weeks, in reply, said the Resident Manager ought to know something about the requirements of the water-works; and he told the Council to try using coke mixed with small coal. He could get all the steam he required with a saving of £3 per week compared with Welsh coal. He asked the Council, as business men, whether they should not get the best fuel at the lowest price. If it were not as Mr. Harvey had said, why was he kept in his position? The members of the Water Committee ought to back him up in his opinion, and get the best they could, in the interests of the ratepayers. The recommendation was carried by eleven votes to five.

LEGAL INTELLIGENCE.

THEFT OF A GAS METER AND FITTINGS.

Meter Stolen and Gas Allowed to Escape.

At the County of London Sessions last Thursday, before Mr. Robert Wallace, K.C., sitting at the Sessions House, Newington, Alfred Spooner and Joseph Beckett, labourers, pleaded "Guilty" to stealing a gas-meter and the sum of 3s. 5d., the property of the South Metropolitan Gas Company. Mr. Purcell, who prosecuted, said the case was more than usually serious, because some of the London Magistrates had frequently commented on the facility with which automatic coin-receiving meters were robbed of their contents, and on the temptation there was to some persons of finding money within reach. For some time the Company, owing to numerous robberies, considered the question of strengthening the boxes; but they were afraid that thwarted thieves would go the length of removing meter and box, and leaving the gas escaping, thereby causing grave danger to persons living near. The Company did, in fact, strengthen the boxes; and in the present case their fears were justified, because the prisoners left the gas escaping at a house in Livingstone Road, Clapham Junction. But for the promptitude of two police officers, who, though almost overpowered by the gas, succeeded in cutting it off, the results might have been most disastrous. Detective-sergeant Purkiss said that during the past year 250 gas-meters had been broken open in the district. Two previous convictions were proved against Spooner and six against Beckett; and the former was sentenced to nine months' and the latter to twelve months' imprisonment.

On the same occasion, Henry Cheeseman and George Gallant, labourers, and William Abberley, a costermonger, were charged with stealing a quantity of gas-fittings from an unoccupied house in Maypole Road, Battersea. A detective said that the prisoners did no work. They went about looking for unoccupied houses, which they entered and stripped of the gas and water fittings, causing an enormous amount of damage for very trifling gain. One of the witnesses—a milkman named Newbury—who interfered with the prisoners in their operations, stated that Abberley struck him several blows with a gas-pendant, inflicting a wound on his head. Cheeseman was sentenced to twelve months', Gallant to four months', and Abberley to fifteen months' imprisonment. In sentencing Abberley, Mr. Wallace said he was very lucky not to be standing on his trial for seriously injuring the witness Newbury. He (the Judge) highly commended the witness, and thanked him sincerely. He expressed regret at Newbury's injury, and awarded him £1 in addition to his expenses.

Incandescent Mantle Company, Limited.

A petition for the compulsory winding-up of this Company, presented by Mr. Ernst Hildebrandt, which has been pending for some time, was mentioned to Mr. Justice Neville last Tuesday. Mr. Lailey stated that the parties had come to terms, and it had been arranged that the petition should be withdrawn, the Company paying the petitioner's costs. His Lordship sanctioned the agreement.

Rawcliffe and District Gas and Coke Company, Limited.

Last Saturday, a debenture holder's action, brought by Mr. Reed against this Company, was before Mr. Justice Warrington. The action came on as a short cause upon a motion for judgment in default of defence. His Lordship asked whether the Company resisted the motion. Mr. Willett, who represented them, said he could not oppose the motion. Mr. MacKay appeared for the plaintiff, and asked for the usual order for accounts and inquiries; and his Lordship at once made it.

Charge of Theft by a Clerk.

At the Marylebone Police Court, last Saturday, Arthur Percival Jemmett, 26, for eleven years a clerk in the service of the Gaslight and Coke Company, was charged, before Mr. Plowden, with stealing two postal orders and two penny stamps, to the value of £1 3s. 8d., belonging to the Company, and forging and uttering two postal orders and thereby obtaining £1 3s. 8d. Mr. Humphreys, who prosecuted on behalf of the Company, explained that for a long time their consumers had complained that postal orders sent in payment of accounts to the branch office at Kilburn had not been acknowledged; and in some instances, in consequence of the supposed non-payment of accounts, the Company had cut off the gas. Inquiries made by the Post Office and the police showed that since Sept. 16 last thirteen postal orders which had been sent to the office had not been paid in, and eleven had been cashed after the signatures had been forged. The defendant had been employed at the Kilburn branch office for eleven years; his salary being £95 a year. Mr. A. E. Houstead, the Inspector in charge of the office, said the defendant was one of the Company's most trusted servants; and during the eleven years he had been with them thousands of pounds in cheques and postal orders had passed through his hands. The irregularities in the office commenced about twelve months ago. The accused was remanded.

Prestwich and its Gas Supply.—The Prestwich District Council have under consideration the question of promoting a Parliamentary Bill with the object of acquiring the Radcliffe Gas Company's interests in their district; and at the last meeting of the Radcliffe Council, a letter was read from the Clerk to the Prestwich authority asking for an expression of opinion on the subject. A resolution was adopted by the Radcliffe Council to the effect that they are not at present in a position to express an opinion.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Company was held last Friday at De Keyser's Royal Hotel—Mr. CHARLES HUNT presiding.

The SECRETARY (Mr. Charles M. Ohren) read the notice calling the meeting; and the Directors' report and the statement of accounts were taken as read.

THE FRUIT OF A PROGRESSIVE POLICY.

The CHAIRMAN, in moving the adoption of the report and accounts, said in the first paragraph of the report prominence was given to the increase in the gas consumption of 3·41 per cent. as being the largest which had been experienced by the Company for several years. The significance of this increase lay in the fact that considerable additions were made to the number of consumers during those years; the comparative leanness of which in regard to consumption being largely accounted for by the change to more economical methods of using gas. It was already well known to the proprietors, but might bear repetition, that almost before the inroads made by the substitution to a great extent of Welsbach mantles for flat-flame gas-burners had been compensated for by increased consumption in other directions, the inverted burner began to take the place of upright incandescent burners, to the further advantage of the consumer. As they were also aware, the Company had done, and continued to do, their best to encourage this use of improved methods—not only for lighting, but also for heating and cooking—in the firm belief that to give satisfaction to the consumer was to the ultimate advantage of the undertaking, even though involving temporary loss of revenue. It was gratifying, therefore, to be able to feel that this policy was now bearing fruit; and that it was enabling the Company to more than hold their own against electricity, the competition of which, he need hardly say, did not tend to diminish in activity. From this competition, however, gas, when judged according to merits, had nothing whatever to fear. Of the two illuminants it continued to be both the cheapest and the best, as proved by the preference given to it for street lighting whenever the selection was not swayed by other considerations. As a matter of course, they could not, nor did they, in the least object to competition from whatever source this might arise, so long as it was fairly conducted. Such competition they were at all times ready to meet, and entertained no apprehension as to the result. But they did think it hard that local authorities should be placed by the Legislature in the position of trading competitors; and that rates, to which gas companies largely contributed, should be made to serve as security for a business which was carried on in active competition with theirs. However, things being as they were, they could only continue to do the best under the circumstances for both consumers and shareholders. Speaking of the Legislature reminded him that they had to congratulate—which he was sure they all did most heartily without reference to politics—their friend and Director, Sir Fortescue Flannery, on having been returned as a member of the new Parliament.

IMPROVED OUTLOOK FOR GAS HEATING.

The depression of trade, which was acutely felt a year or two ago, appeared to be happily passing away; and the general opinion seemed to be that better times were in store for the industrial world. In these—if they should come—the Company might hope to share; if, indeed, they were not already sharing in the shape of the greatly increased demand which, as mentioned in the report, had set in for gas-heating appliances of all kinds for domestic use. As regarded gas-fires in particular, this increased demand was evidence that the prejudice which formerly existed against their use was giving way to the inexorable logic of facts. Medical opinion had declared itself in their favour; chiefly because they could be easily controlled to give any required temperature. A local doctor told him quite recently that, whereas he formerly objected to their use in sick rooms, he now recommended them. Hot-water circulators heated by gas, and other similar gas-heating appliances, were also being increasingly used; so that the prospect in this respect might be regarded as distinctly good. The Company's Sales Department had, as the proprietors were aware, been strengthened in order to bring under the notice of consumers, among other things, the cleanliness, convenience, and economy of gas as a heating agent; and those who were engaged in this department were, he thought, to be congratulated upon the success which had already attended their efforts under the new arrangements.

DAYLIGHT CONSUMPTION.

Hitherto, cooking-stoves and boiling-rings had represented the chief use of gas as a heating agent in the household; and of these there were now more than 26,000 in use in the Company's area of supply. They were, as the proprietors knew, used chiefly in the daytime, and more in summer than in winter, when they often enabled the coal-fire to be dispensed with. They were, consequently, important aids to daylight consumption—a class of consumption which it was particularly desirable to cultivate, because it meant increased output without corresponding increase of distributing plant. It might interest the proprietors to know that already daylight consumption was answerable for above one-half the annual output, and that the disproportion which formerly existed between summer and winter consumption had been reduced by nearly one-half. This levelling-up of summer consumption was a good thing, if only because it tended to improve labour conditions by giving greater permanence to employment; casual or intermittent work being a fruitful source of inefficiency and unemployment.

A REVIEW OF THE ACCOUNTS.

The accounts showed that their coal bill was less, though more coal had to be used owing to the larger output of gas. This was chiefly due to lower prices; but there had also been a small increase in the quantity of gas sold per ton of coal carbonized. What might be the position in respect of prices when they were next in the market for coal, it was not at all easy to say; but it was to be hoped that reasonable counsels would prevail, notwithstanding those visions of high prices in which the coal owner was so prone to indulge. The unrest by which in some districts the Coal Mines Regulation (Eight Hours) Act was ushered in seemed to be gradually subsiding. It did not to any great extent directly affect the districts from which the Company were drawing supplies; and these, throughout the winter, had been good and abundant. The course of coal prices was naturally a matter of considerable anxiety to the Board, because upon it depended almost wholly the price at which it was possible to supply gas. But the only control they could exercise over this most important factor was to do their best to purchase in the cheapest market. Carbonizing wages showed a reduction; and these were the lowest in London. The cost of repairs and maintenance exhibited some increase, which was fully justified by the necessity for maintaining the works and plant in a condition of complete efficiency, and for keeping pace with modern requirements and improvements in manufacturing methods. Somewhat higher figures also appeared under the head of distribution charges; and there was a probability of still higher figures in the future. Gas companies were like railway companies in this respect, that modern conditions imposed on them the necessity of catering more and more for the convenience of their customers. However, the money was well spent, because the surest way to retain the confidence of consumers was to give them reason to feel that they were well looked after. For the increased cost of rates, there was, he was afraid, no remedy; but most careful watch was being kept over the proprietors' interests in this respect. The item for rents was a new one, and represented the rents paid for the additional show-rooms. At these show-rooms information was given on all matters relating to the use of gas; and cooking lectures were held throughout the season. They had already proved a great convenience to the consumers; and the business done in connection with them was increasing very satisfactorily.

GAS AND RESIDUALS RECEIPTS.

On the other side of the account, the increase of consumption, as stated in the report, had almost balanced the reduction of price which took effect as from the 1st of July last year, so that the receipts for gas showed only a very slight falling off. The increase of £209 in the rental derived from meters and stoves was one result of the expansion of business to which he had already referred. Lower prices had had to be submitted to for coke; but a larger quantity was made for sale, so that the returns for this residual showed substantial improvement. The return for tar was also better, both in regard to price realized and yield per ton of coal. Tar was in increasing demand for road-making purposes, and hopes were entertained of a more extended use of one of its constituents—benzol—as a substitute for motor spirit. It was not, however, advisable to build too much upon the realization of these prospects, because tar values had a disappointing history, and had for a long time depended less upon new uses for it, or its derivatives, than upon the quantity produced from other sources than town gas manufacture. Similarly, the markets for sulphate of ammonia were affected by the increase of production from other sources. The Directors could not, of course, complain that the example set by the gas industry in the recovery and utilization of residuals should be so extensively followed as it now was wherever coal in large quantities was used for industrial processes. The world was all the richer for this practice of economy, though gas consumers had to pay a little more for their gas.

CAPITAL AND DIVIDEND AND BONUS.

There had been added to capital the sum of £2564, which was due partly to additions to manufacturing plant, and partly to the provision of meters, services, and stoves for the 685 consumers who, he was glad to say, were added during the half year. After payment of all fixed charges, the Directors were in a position to recommend payment of the full dividend to which the shareholders were entitled in consequence of the reduction of 1d. per 1000 feet made last year. This was an increase of 3s. 4d. per cent. per annum, and was the highest dividend ever paid by the Company. It represented an addition to the sum to be distributed among the shareholders for the half year of £504, while the saving to the consumers by the 1d. reduction was for the same period £2700; the employees' share being an additional bonus of ½ per cent.—increasing the bonus upon their earnings to 6½ per cent.

CO-PARTNERSHIP—A LIVESEY MEMORIAL HALL.

The re-election of Mr. George Ross as Employees' Director, which was referred to in the last paragraph of the report, was additional proof that the employees were to be trusted, not only to select a good man, but to keep him when they had got him. Of co-partnership generally, he was glad to be able to repeat what had been already said on many occasions—namely, that it continued to give satisfaction to all concerned. It formed a true bond of union between employers and employed, and continued to be mutually, and in a very high degree, beneficial. Last autumn the Board had the satisfaction of assisting at the inauguration of a memorial to their late Chairman (Sir George Livesey) which had been subscribed for entirely by the employees. This was in the form of a bronze bust of their late friend, and was mounted on a suitable pedestal, and placed in a conspicuous position on the works near the entrance gates. The ceremony was attended by from 400 to 500 of the employees, and great interest was taken by them in the proceedings. He might also say, in concluding these remarks, that the Board had had under consideration the desirability of founding some memorial to Sir George, indicative, not only of the great services he rendered to the Company, but also of the aims and objects with which he was so closely identified. After careful consideration, it had been decided to erect upon the works, and adjoining the Catford Road, a recreation room for the employees, to be called "The Livesey Memorial Hall." Bearing in mind the very great interest which was always taken by Sir George in all matters affecting the well-being of the employees, the Directors felt sure the proprietors would agree that a more suitable memorial could hardly have been decided upon. Plans had been prepared; and it was expected that the building—which it was hoped would be a model one of the kind—would shortly be commenced. When completed, it was under contemplation to break through—for once at any rate—the tradition which obliged them to hold their general meetings on the North side of the river, and give the share-

holders an opportunity of inspecting the new building, and also the works, which probably many had not seen.

The Adoption of the Report.

Sir J. Fortescue Flannery, Bart., M.P., said he had great pleasure in seconding the motion which had been put to the meeting in so full a speech by the Chairman, and in associating himself with every word that had been said. Mr. Hunt had so thoroughly set forth the work of the Company, and everything that affected the undertaking, that it was only necessary for him (the speaker) to second the resolution quite formally. He did, however, wish to remark that the points that had been mentioned, including the question of daylight consumption, were full of interest for the Company. There was no doubt whatever that when they could steady employment so as to make it as nearly as possible equal at all seasons of the year, they were benefiting not only the proprietors but those whom they employed. In the case of most gas-works, something like one man out of six had, under the old conditions, to be discharged during the height of the summer, or other employment found for them. Now, this was a serious proportion of the labour that such undertakings employed during the winter time; and therefore every help they could give towards the reduction of such fluctuation was in the mutual interest of employer and employed. But there was also, as the Chairman had pointed out, the very important question of utilizing the plant to its fullest capacity. It was evident that the plant must be large enough to cope with the maximum winter demand; and therefore a portion of their investment was idle when it was only being utilized at the minimum. Thus when they could advance, as they were advancing, in the utilization of the plant during the daylight as well as during the hours of darkness, they were advancing in the direction of improving the position of both employer and employed. These were points which were not always prominent in the minds of investors in gas; but they were having the closest attention on the part of the Board. Then the Chairman referred to the very important question which was so clearly brought out by their friend Mr. Carpenter at the recent meeting of the South Metropolitan Gas Company—that was, carbonizing efficiency. The figures that Mr. Carpenter mentioned were very remarkable—that in a period of ten years the efficiency in carbonizing had increased some 25 per cent. In other words, for every ton of coal carbonized 25 per cent. greater volume of gas was yielded. This might also be said to apply to the South Suburban works. Figures had not been definitely named, nor need they be; but the advance which their neighbours in the Old Kent Road had obtained had also been secured in very nearly the same proportion in the works at Sydenham. And this was being done, as their neighbours were doing it, under very adverse conditions with regard to coal—that was, with coal that was less favourable for gas making than that which was easily obtained ten years ago. Thus the shareholders would see that even in a well-established industry like gas manufacture, there was room for great advancement, and that every possible opportunity for utilizing this room was being made use of. Then one word about co-partnership, which he was glad had had so much attention devoted to it in the Chairman's speech. Every year—every day, they realized the increasing benefit of co-partnership. Every day they were confirmed in their appreciation of the splendid reform which their late departed friend Sir George Livesey initiated, and which he (the speaker) believed would last as long as existing social conditions lasted in this country. Co-partnership was every day bringing forth fresh proofs of its advantages. A short time ago, the Directors heard of one or two men employed in the works—that was to say, co-partners—who, in the course of their walks abroad in the evening, had been making special excursions over the district to find out streets where new houses were being built, and where consequently fresh opportunities for extending the gas service-pipes might arise, and quite voluntarily, quite because of *esprit de corps*, quite because of their being co-partners, they had brought back the information to the works, where it was utilized. This was only a small illustration; but it showed the spirit in which co-partnership was being carried out in connection with the Company. He was sure one of the happiest days for shareholders generally who were not employees of the Company would be when—perhaps at the next half-yearly meeting, or certainly the one afterwards—they accepted the Chairman's invitation (as the Board hoped they would do in large numbers), and went down to the works to hold the meeting and shake hands with their brother co-partners who were engaged there.

No shareholder having any questions to ask, the resolution was then put to the meeting and carried unanimously.

The Dividend.

The Deputy-Chairman (Mr. Jabez Light) moved that a dividend for the half year ended Dec. 31 last be declared at the rates per annum of 5 per cent. on the preference stock and 5⅔ per cent. on the ordinary stock, less income-tax. He remarked that the Chairman had fully explained the result of the past half-year's business; and no doubt all the proprietors would have the same feeling—that it had been a great success. Of course, their competitors the electrical people were exceedingly busy at all points; but in spite of this, the South Suburban Gas Company had had an extremely good half year. They had reduced the price of gas 1d. per 1000 cubic feet, which meant, he believed, a concession of something like £2500 to the consumers; they were able to pay an increased dividend; and they had placed to the credit of the co-partnership account a sum of £1700. All these facts spoke for themselves.

Mr. W. G. Waller (an Employee Director) seconded the proposition; and, in doing so, took the opportunity of thanking the proprietors for the generous way in which they treated the employees. Every man, he said, was happy and contented, and had a desire to do better to-day than he did yesterday.

The resolution was agreed to.

Re-Elections.

Mr. Robert Morton, in proposing the re-election of Mr. Hunt as a Director, remarked that he had listened with great interest to the comments that the Chairman had made on the transactions of the Company during the last half year. They were certainly very satisfactory to all the Board, and must be so to the shareholders as well. It had not all depended on Mr. Hunt as Chairman; but very largely it had done so. He gave all possible encouragement to the officers of the Company, and was well backed up by them.

Mr. John Boraston seconded the motion; saying that the removal of the dominating and magnetic personality of the late Sir George Livesey might well have led to some little disturbance in the midst of the Board; but this had not been the case. The Board was a pleasant one, and the members were a very happy family. This was testimony to the tact and ability of their Chairman, and at the same time one of the best guarantees for the effective carrying on of the business. They all felt that the mantle of Sir George Livesey had fallen upon shoulders capable of bearing it with dignity, honour, and credit.

The resolution having been carried,

Mr. Hunt, in acknowledgment, said he took a very deep interest in the welfare of the Company, not only as an old shareholder (he believed he became one as long ago as 1878), but chiefly because of its association with the work of the late Chairman. He felt it a great privilege to be able to assist in some measure in carrying this work on.

Mr. Charles Carpenter was also re-appointed, on the motion of the Chairman (who remarked that he was one of the most valued and valuable members of the Board), seconded by Mr. G. Ross.

Mr. Carpenter, in returning thanks, said he felt it a great honour when he was put upon the Board to follow in the footsteps of his dear late friend Sir George Livesey.

On the motion of Mr. T. Guyatt, seconded by Mr. T. P. Fisher, Mr. Samuel Wood, F.C.A., was re-elected an Auditor of the Company.

Votes of Thanks.

Dr. Turner proposed a vote of thanks to the Chairman and Directors; remarking that everything was most satisfactory. He lately had to go over something like thirty of the largest houses in the most fashionable parts of London; and nothing struck him more than, on going into the kitchens, to see the universal use of gas-stoves. These were houses where large entertainments would be given; and it proved what could be done with gas-stoves in the way of cooking. It was a wonder to him that gas-cookers were not more used by the middle and poorer classes. No doubt, from what the Chairman had said, they were much more largely employed than was formerly the case; but, even so, he thought they could be used a great deal more. It seemed to him that, had it not been for the competition of electricity, they would not have had the improvements in gas that were to be seen. It had made those who studied the illuminating and heating power of gas strive to overcome their difficulties; and they had overcome them, and had got far ahead of electricity. The results they had had put before them that day would not have been attained except for the Board taking great care of the proprietors' interests. The increased consumption would not of itself have enabled the payment of the extra dividend of 3s. 4d.

Mr. H. Gundry seconded the vote; and it was heartily accorded.

The Chairman, in the course of his acknowledgment, said he thought they were all agreed that the electric light had done good work for gas; but they felt that gas was superior to electricity, and intended to push it for all it was worth. The Board was a perfectly united one, with only one desire—to further the interests of the Company. He proposed a hearty vote of thanks to the officers and employees. They were greatly indebted to them for their loyalty and devotion; and he could not too strongly express himself with regard to the manner in which they had one and all discharged their duties.

Mr. T. Wilkins seconded the motion, which was agreed to.

The vote was responded to by Mr. S. Y. Shoubridge, the Engineer, on behalf of himself and his staff, and by Mr. Ohren for the Secretarial department.

CROYDON GAS COMPANY.

The Half-Yearly General Meeting of the Company was held last Friday, at the Offices, Katharine Street, Croydon—Mr. Charles Hussey, J.P., in the chair.

The Secretary (Mr. W. W. Topley) read the notice convening the meeting; and it was agreed to take as read the Directors' report and the accounts.

Satisfactory Progress.

The Chairman, in moving the adoption of the Directors' report and accounts, said he thought the latter could be regarded, without reserve, as very satisfactory. In all departments, the Company's business showed that gratifying headway had been made. In the output of gas, there was an increase for the half year of 33 million cubic feet, or 5·54 per cent. Closely related to this was the pleasing increase in the use of gas for heating, as shown by the additional number of gas-fires sold and let on hire; these representing for the half year more than 1500—by far the largest growth in this direction the Company had so far experienced in any half year. The number of consumers had increased in the half year by 1177; and the gas accounts now reached the large total of 35,644. As would be seen from the accounts, the revenue from the sale of gas was £2754 more than a year ago; and it must be remembered that for three months of the half year they were comparing with a period when the price of gas was 2d. higher than it was now—this reduction representing a gain to the consumers in the quarter of £2000.

Coal and Coke and other Residuals.

The lower prices at which the Directors were able to enter into contracts for coal last year, and the more favourable prices of gas oil, had enabled a considerable saving to be effected in the expenditure on raw materials. This he pointed out last August; and he then said that against this saving was to be set an anticipated considerable loss of revenue from the lower price of coke. He was glad to say that this loss had been much less than was expected—in fact, the actual revenue from coke was, as the proprietors would see, £250 more; and the average price had been only 7d. per ton less, against a saving in the price of coal of 1s. 4d. per ton. This satisfactory price of coke was largely due to a demand that sprang up in the late autumn, in consequence of a spurt of cold weather, and to the small stocks then existing in London.

In their own case also, it was partly due to the increasing proportion of the make which they were able to sell locally. At all times, they had to send away by rail the larger part of the coke made. But the Company did all they could to encourage its local use; and it was satisfactory to find that this use was extending. It now represented about 30 per cent. of the coke they had for sale. They were producing a coke in pieces of small and even size, specially suited for domestic grates and small greenhouses; and this was finding its way into favour. Another satisfactory residual was tar. For many years this had been a disappointing product to all makers of gas; the price realized being extremely low, owing to the quantity manufactured at gas-works tending to increase faster than did the demand. Now, however, there was found a use for large quantities in treating roads. Recognizing the value of this local outlet, their Engineer had for some time past paid special attention to the treatment of the tar to adapt it to the requirements of local authorities; and the quality of the tar sold in this direction had been very well reported on. The importance of using for road treatment a suitable tar could not be too strongly insisted on; and they might congratulate themselves that they stood to secure a fair share of the demand that was springing up. In each of the last two years, the local sales of tar had improved; and the average price realized showed a corresponding improvement—representing in the two years 14 per cent. Briefly, the gain from the prices of coal, if set against the results from residuals, showed a net saving equal to rather over 1d. per 1000 cubic feet of gas. The gain on coal would have been greater, had not it been thought desirable to hold a large stock in view of the unsettled state of the coal trade. Had this not been the case, the question of lowering the price would have had the serious consideration of the Directors. They felt, however, that it would be unwise to do so for the present; but if the course of events in the coal districts became more favourable, he hoped shortly to announce a reduction.

CO-PARTNERSHIP.

The Directors had every reason to be satisfied with the results of the co-partnership with the Company's employees which he announced a year ago; and no doubt this had in some degree helped to produce so good a half-year's trading.

FREE MAINTENANCE—SERVICE GOVERNORS AT LOW RENTAL.

Reference was made in the report to the favour with which consumers were receiving the Company's offer of free attendance to their incandescent gas-burners. The new system came into force only in October last; and in the three months to December, the number of consumers whose burners were under the Company's direct supervision had increased from 800 to more than 2000. The cost of this service to the Company was considerable. But it could be safely said that the gain to consumers was much greater than was represented by the cost to the Company. A yet further benefit was experienced by those consumers who had availed themselves of the Company's offer to fix governors to their service-pipes at low rentals. These governors enabled uniformly good results to be obtained from incandescent burners, and from gas cooking and heating stoves. So far as lighting was concerned, consumers who had governors, and who allowed the Company to keep their burners in order, might safely congratulate themselves on having by far the cheapest, most reliable, and most satisfactory artificial light that was at present obtainable under any conditions. They had in the staff of their distribution department (to whose energies much of the recent development of their business was due), the means of giving expert advice free to any consumer on any point relating to the use of gas; and it was to be hoped the number of consumers who availed themselves of these services would continue to increase.

THE STANDARD BURNER BILL.

The proprietors had had notice that this meeting was to be immediately followed by one at which the Directors would ask them to approve the Bill being promoted in Parliament dealing with the standard burner for testing. The provisions of the Bill would then be explained by their Engineer. At present, therefore, he (the Chairman) would only say in regard to it that it should receive the support of every stockholder and of every consumer; for its ultimate result, if passed by Parliament, would be for the benefit of both.

LOCAL DISTRIBUTION OF PROFITS.

He was not sure whether it was generally known how intimately the affairs of a gas company were connected with those of its district, and thought it might be interesting if he gave some particulars as to the money the Company circulated in the neighbourhood. Taking last year, to begin with they paid in local rates alone nearly £8000, and in salaries and wages (practically the whole of which were spent in the district) £48,000; to local contractors for gas-fitting work—chiefly, therefore, for wages—£4400; and to other local tradesmen amounts reaching a total of £5000. In addition, a large proportion of the dividends paid—in fact, more than £18,000—went to residents in the neighbourhood, as a large number of the stockholders were also consumers. In all, well over £80,000 would be spent in the district in the year. He thought this statement might be interesting to some of the stockholders and consumers present. There was often an idea, too, that a gas company was a corporation taking large profits out of the users of gas for the benefit of wealthy capitalists who held its stock. Well, each of the 1500 odd stockholders in this Company obtained an average income from his holding of rather less than 11s. a week. Really a gas company such as this was, in large measure, a co-operative undertaking; and while its interests were absolutely dependent upon those of the residents in the district it served, the interests of those residents were also very intimately connected with those of the gas company.

AN EXHIBITION AT SHEPHERD'S BUSH.

Many of the proprietors probably knew that there was to be a Japan-British Exhibition at Shepherd's Bush this year, on lines generally similar to those of the Franco-British Exhibition held two years ago. The London and Suburban Gas Companies were uniting in organizing an exhibit which would, it was hoped, bring vividly home to many of the visitors there the great advantages which gas offered to the householder; and he was sure the proprietors would approve of the action the Directors had taken in agreeing to share in the cost of this up to a certain amount.

SOME FINAL FIGURES.

It would be seen that £2310 was charged to net revenue account in respect of disused plant at the old Carshalton works; thus writing this balance entirely out of the Company's accounts. The renewal fund was charged with £1500, the value of the old sulphate house and plant now pulled down to make room for the new coke plant at No. 2 house, and £1000 was carried to the fund from the net revenue account. After these charges were borne, there remained a balance of profit sufficient to pay the usual dividends, and add £913 to the carry forward—making the substantial sum of £7465.

The DEPUTY CHAIRMAN (Mr. T. Rigby) seconded the motion; remarking that he quite agreed with the Chairman as to the results of co-partnership. The effects of the mutual co-operation thus established could be seen in the accounts.

The motion was unanimously carried.

Mr. WILLIAM CASH proposed that dividends be declared at the rates per annum of 14½ per cent. on the "A" stock, 11½ per cent. on the "B" and "C" stocks, 5 per cent. on the "D" stock, and 10 per cent. on the "E" stock, all less income-tax. He observed that the accounts were very satisfactory ones. The dividends had been well earned; and there was a substantial balance over. The 5½ per cent. increase in consumption was very gratifying, though there was no doubt whatever they had been, in some measure, assisted by the climatic conditions prevailing during the latter part of the half year. The Directors looked with confidence to the half year they had now entered upon.

Mr. PERCY H. HALL seconded the proposition, which was unanimously carried.

Moved by the DEPUTY-CHAIRMAN, and seconded by Mr. MAITLAND, the Chairman was unanimously re-elected to his seat at the Board, as was also Mr. Samuel Spencer, on the motion of Mr. WILLIAM CASH, seconded by Mr. W. EDGAR.

The CHAIRMAN acknowledged the renewed confidence of the proprietors, as also did Mr. SPENCER. The latter, who was elected to the Board on the amalgamation of the old Carshalton Company fifteen years ago, stated that, when those works were taken over, the sales in the district were only about 30 million feet a year, now they were 190 millions, or about six times more. He should think that was a record for any district in the country in such a period.

Moved by Mr. DYER, and seconded by Mr. LAMBERT, the retiring Auditor (Mr. J. C. Benwell) was re-appointed.

Proposed by Mr. TAYLOR, and seconded by Mr. SAMSON, a cordial vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN acknowledged the vote on behalf of himself and his colleages. Proceeding, he moved a similar recognition of the services of the Engineer and General Manager (Mr. Helps), the Secretary (Mr. Topley), the Assistant-Engineer (Mr. Caddick), the Distributing Superintendent (Mr. Sandeman), Mr. Anderson (Assistant Secretary), and Mr. Haines (Assistant Accountant), the staffs, and workmen generally, of all of whose services he said he could not speak too highly.

Mr. SPENCER seconded the motion; and it was heartily agreed to.

THE LARGEST DISTRICT.

Mr. HELPS acknowledged, on behalf of himself, his staff, and workmen, the kind words used and the cordial endorsement of the proprietors. He added that the scheme of co-partnership had met with the great approval of all who had joined it. He was pleased to see present a considerable number of the men whom the scheme of co-partnership had made proprietors. The gas industry he believed was just as strong now as ever it was. The indication was, he thought, when they could show 5½ per cent. increase, that gas was by no means dear, that it was flourishing, and would hold its own for many years to come. He believed their district was larger than that owned by any gas company in the country—even larger than that of the Gaslight and Coke Company, at any rate prior to their taking over the West Ham Company. They (the Croydon Company) had something like 78 square miles to supply. This was a considerable amount of ground to cover; and it was a matter of no great ease for the officials in the distribution department to look after it. But he was glad to say they did it very thoroughly.

Mr. TOPLEY also spoke of the appreciation of himself and staff at the kindly way in which the vote had been received.

The Standard Burner Bill.

A Special General Meeting was then held, for the purpose of considering, and, if thought fit, approving of, the Standard Burner Bill, in the promotion of which the Company are joining.

The CHAIRMAN moved a resolution accordingly. He remarked that this was a matter that should receive the support of proprietors and consumers alike, because it would be to their advantage. It might be of interest to know that the Directors had received proxies from 90 proprietors, representing a holding in the Company of £28,875. He would ask Mr. Helps to explain the Bill.

Mr. HELPS read the preamble and provisions of the Bill, explaining, as he did so, the object sought to be attained.

Mr. C. E. BOTLEY seconded the motion. He remarked that there was no doubt about it the proposed change of test-burner would confer a benefit on the consumers, as it would give the Company greater freedom of action. They were simply asking by this Bill to have the same privilege and right as neighbouring companies. They had the South Suburban Company on the one side, and the Mitcham and Wimbledon Company on the other, who had the authority of Parliament to have their gas tested by this burner. The present burner, owing to the alterations in the manufacture of gas which had been necessitated of late years, did not give a true reading of the actual quality of the gas. As the proprietors were aware, the consumers derived the largest amount of benefit, under modern legislation, from any economies realized in the manufacture of gas. Moreover, it would not pay the gas companies, in view of municipal competition in electricity supply, to distribute an inferior article.

Mr. BALDOCK and Mr. DYER also spoke in support of the resolution; and it was unanimously carried.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report that the Directors of the Commercial Gas Company will present at the half-yearly meeting on Thursday.

The revenue account shows a net profit for the half year of £70,598 13s. 11d., which, added to the balance of £23,058 15s. 3d. brought forward from last year, produces a net revenue balance of £93,657 9s. 2d. Deducting therefrom £8832 4s. 10d. for interest, there remains standing to the credit of the net revenue account a balance of £84,825 4s. 4d. available for dividend. The Directors recommend the payment of dividends at the rates of £5 4s. per cent. per annum on the 4 per cent. stock of the Company, and of £5 per cent. per annum upon the 3½ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year. Having regard to the continual fall in value of trustee securities, in which the Company's investments on account of the insurance and reserve funds are placed, the Directors have written these investments down to market prices on Dec. 31, 1909. Under the powers of the Commercial Gas Act, 1902, the Directors made an issue of £20,000 of 4 per cent. stock in September last to the consumers and employees of the Company.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 31st of December amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remain unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added by conversion; making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. The receipts on capital account amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,443,767 10s. 9d., with a nominal amount of £1,212,812 10s. added by conversion—together, £2,656,580 0s. 9d. There is consequently a balance of £50,514 16s. 4d. carried to the balance-sheet. The net expenditure on capital account in the half year was £9691, apportioned as follows: New and additional mains, services, &c., £1837; stoves, £4032; prepayment meters and fittings, £3822. The reserve fund amounted at the close of December to £37,107; and the insurance fund to £35,100. The following is the

REVENUE ACCOUNT.

Expenditure.

Manufacture of gas—		
Coal and oil, including dues, carriage, unloading, and trimming	£91,320 13 11	
Salaries of Engineer and officers at works	2,417 3 0	
Wages (carbonizing)	13,484 0 9	
Purification, including labour	1,410 16 4	
Repair and maintenance of works and plant, materials and labour (less £315 5s. 5d. received for old materials)	32,884 11 5	
		£141,517 17 5
Profit sharing		2,783 7 4
Distribution of gas—		
Salaries and wages of officers (including rental clerks)	£4,484 4 9	
Repair, maintenance, and renewal of mains and services, material and labour	5,992 15 5	
Repair and renewal of meters	2,211 9 6	
,, ,, ,, stoves	7,827 9 2	
,, ,, ,, ,, prepayment meters and fittings	10,545 13 11	
Incandescent mantle maintenance	569 7 8	
		31,631 0 5
Public lamps—lighting and repairing		2,472 19 8
Rent, rates, and taxes		12,698 8 10
Management—		
Directors' allowance	£1,250 0 0	
Company's Auditors	75 0 0	
Salaries of Secretary, Accountant, and clerks	1,235 7 6	
Collectors' salaries and commission	1,678 15 0	
Prepayment meter collection	2,947 19 1	
Stationery and printing	913 7 6	
General charges	1,409 16 3	
		9,510 5 4
Bad debts		910 19 10
Law and parliamentary charges		146 5 9
Superannuations and allowances		1,238 7 9
Official officers, &c.		103 18 0
Total expenditure		£203,013 10 4
Balance carried to net revenue account		70,598 13 11
		£273,612 4 3

Receipts.

Sale of gas—		
Common gas per meter at 2s. 6d. per 1000 cubic feet (98,485)	£197,998 14 8	
Public lighting and under contracts, common gas	5,666 8 9	
	£203,665 3 5	
Less discounts and allowances	3,635 10 11	
		£200,029 12 6
Rental—		
Meters (23,764)	£2,846 17 1	
Stoves (59,143)	9,429 18 10	
Prepayment meters (73,95)	14,394 9 4	
Incandescent mantle maintenance	557 9 7	
		27,228 14 10
Residual products—		
Coke, less £ 012 1s. 9d. for labour	£17,326 10 6	
Breeze, less £1173 5s. 2d. for labour	2,311 14 9	
Tar	7,516 18 7	
Ammoniacal liquor and sulphate of ammonia	9,145 13 1	
		46,300 16 11
Miscellaneous receipts—		
Rent receivable	£14 15 0	
Transfer fees	38 5 0	
		53 0 0
Total receipts		£273,612 4 3

The following are the statements relating to the manufacturing operations of the Company in the half year.

Statement of Coals and Oil.

Description of Coal.	In Store June 30, 1909.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store Dec. 31, 1909.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	29,859	101,947	101,639½	601½	29,565
Cannel	177	..	30	..	147
Total	30,036	101,947	101,669½	601½	29,712
Oil—gallons	397,134	1,386,605	1,315,460	..	468,279

Statement of Residual Products.

Description.	In Store June 30, 1909.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1909.
Coke—tons	4,090	62,272	12,315	52,815	1,232
Breeze—tons	5,542	12,156	..	13,751	3,947
Tar—gallons	478,307	1,236,287	..	1,160,308	554,286
Ammoniacal liquor—butts of 108 gallons	7,302	35,696	32,719	..	10,279
Sulphate of ammonia—tons	80	945	..	895	130

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,786,258	36,656	1,585,618	1,649,067	3917

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, oil, &c., £24,291; coke and breeze, £927; tar, ammoniacal liquor, sulphate of ammonia, &c., £9212; sundry stores, £33,852—total, £68,282. The figures this time last year were: Coal, oil, &c., £23,389; coke and breeze, £8545; tar, ammoniacal liquor, sulphate of ammonia, &c., £8989; sundry stores, £34,969—total, £75,892. A sum of £13,508 stands in the balance-sheet as employees' bonus and savings, compared with £16,956 at the end of December, 1908.

LIVERPOOL UNITED GASLIGHT COMPANY.

Presiding at the Half-Yearly Meeting of the Company last Tuesday, the Chairman (Mr. H. Wade Deacon) said the result of the past half-year's work had been very satisfactory; there having been an increase (in all classes of consumers) of about 3 per cent. in the quantity of gas consumed, as compared with the corresponding six months of the preceding year. The report was adopted, and a dividend was declared (less income-tax) for the half year to Dec. 31 of 5 per cent. on the ordinary consolidated stock of the Company, and of 3½ per cent. on the consolidated 7 per cent. stock created under the Company's Acts of 1865, 1882, and 1886.

A special meeting was subsequently held, when the Directors approved of the terms of the Bill which is to be introduced into Parliament entitled "A Bill to provide in the case of certain gas companies for the adoption of the 'Metropolitan' argand burner No. 2 as a standard burner in substitution for the various burners now in use for the official testing of the illuminating power of gas supplied by them, and for other purposes." The Chairman pointed out that the Bill was being promoted by 47 gas companies; its object being to bring into operation one standard burner by which the gas of all these companies would be tested. If the burner was adopted, the Company would be enabled to supply at a lower power than at present, but at the same time to manufacture gas which could be favourably compared with other towns.

SHEFFIELD UNITED GASLIGHT COMPANY.

Half-Yearly Report and Accounts.

In their report for the six months ended the 31st of December, which will be presented to the proprietors at the ordinary general meeting of the Sheffield United Gaslight Company on the 14th prox., the Directors express their pleasure in stating that they are able to present a favourable account of the half-year's working; the consumption of gas having increased by 107,415,000 cubic feet, or 6·35 per cent., as compared with the corresponding period of 1908. The profit, after payment of interest on the debenture stock, amounts to £43,632, which is £208 more than is required for the dividend. This added to the amount brought from last half year leaves a balance of £74,975 to be carried forward. The Directors add that the average price at which gas was sold last half year was 1s. 3·04d. per 1000 cubic feet.

The accounts accompanying the report show that the sale of gas in the half year produced £111,702, the rental of meters and stoves came to £9437, residuals brought in £63,478, and the total revenue was £186,089. The expenditure on the manufacture of gas amounted to £111,363 (coal costing £68,396, and repair and maintenance of plant £21,701); distribution, £13,905; management, £6073; rents, rates, and taxes came to £9621; and the total expenses were £142,432. The amount carried to the profit and loss account is £43,657; and the balance on this account is £118,400.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Mining Dispute and Gas Supply.

The Annual General Meeting of the Newcastle and Gateshead Gas Company was held last Wednesday—Sir W. H. STEPHENSON in the chair.

The Directors reported that the quantity of gas sold during the year was 2,987,042,000 cubic feet—a small increase of 19,603,000 cubic feet, or 0·66 per cent., upon the sales of the previous year; but a satisfactory feature was that the improvement was entirely in the second half of the year, which it was hoped was a sign of the passing of the long-continued depression in the trade of the district. The revenue from gas sold was £281,260, against £266,467, and from residuals £110,079, against £116,563, in the previous year. The number of consumers on Dec. 31 last was 109,276—an increase of 4011 prepayment and 953 ordinary; and the number of cooking-stoves out on hire was 62,845, being an increase of 1310 prepayment and 446 ordinary. Advantage was taken of the necessity to carry out extensive repairs to one of the gasholders at Redheugh, to erect on the same site a practically new holder of larger capacity on the spiral-guided principle, by which means the capacity of the holder was increased from 1,750,000 to 3,315,000 cubic feet.* The cost was £18,406. Reference was made by the Directors to the resignation by Mr. W. Doig Gibb of his position of Chief Engineer of the Company, to take office under the South Metropolitan Gas Company, and to the appointment of Mr. Thomas Hardie, who has been with the Company since 1896, and Manager of the Redheugh station since 1899, to fill the vacancy. They stated that all the further changes necessary upon the appointment had also been made by promotions from the existing staff. The accounts accompanying the report showed that the revenue last year was £425,899, and the expenditure £317,589; leaving £108,310 as the profit for the year. Adding the balance of £547 brought forward, there was produced a total of £108,857. The Directors recommended the payment of dividends at the rate of £4 and £4 7s. 6d. per cent. per annum on the preference and ordinary stocks (less income-tax). These with the interest on debenture stock, loans, &c., to Dec. 31 last would absorb £104,328, and leave a balance of £4529 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, gave some figures from it and from the accounts for the past year. Passing on to general matters, he remarked that, whatever might have been the state of trade in other parts of the kingdom during the past year, on Tyneside it had moved very slowly towards betterment; and it certainly was better in the later months. He trusted that during the present year they would see continued improvement, as there was abundant room for it. Coals were purchased more favourably for the yearly contracts commencing in July; and the coal bill for 1909 was £22,233 less than in the previous year. The present disturbed condition of the coal industry of the district owing to the Coal Mines (Eight Hours) Act of 1908 coming into operation on the 1st of January last, had been, and continued to be, a source of anxiety to the Company. The coming into operation could not have taken place at a more awkward date for gas undertakings, being the period of the largest consumption of the year. Considerable stocks were accumulated by the Company during the later months of 1909, in anticipation of difficulties in obtaining supplies. Almost without exception, the collieries of the Company's contractors were idle during some considerable portion of January, and in consequence no coals were obtainable against contracts. However, with the stocks, with the purchase of a few thousand tons from collieries working (at a greatly enhanced price, of course), and with the aid of their oil-gas plant, they had managed to pull through without causing any inconvenience to their consumers. He trusted they were approaching the end of the trouble brought about by the introduction of an unnecessary, and, so far as their district was concerned, an uncalled-for Act. Referring to the recent labour troubles, the Chairman said that, of course, the vote which had been taken in the county of Northumberland, the result of which was declared on the previous Saturday, showed that, according to the rules, no strike could take place; but, on the other hand, it showed that a majority of men had voted for a suspension of work. So far as they as a gas company were concerned, it was a matter of vital importance. No greater calamity could come to the district they served, with its population of about 500,000, which relied upon them for its light, than if it were put into darkness. They were trying to avoid inconvenience; and he hoped good sense and reasonable fair dealing would bring present difficulties to an end, and that the Company would be able to get sufficient coal to supply all legitimate wants.

The DEPUTY-CHAIRMAN (Sir Walter Plummer) seconded the motion; and it was carried.

The dividends recommended were then declared, the retiring Directors were re-elected, and the proceedings closed with a vote of thanks to the Chairman.

* The holder was described and illustrated in the "JOURNAL" for Jan. 26, 1909 (p. 231).—ED. J.G.L.

Warrington Corporation Bill.—The result has been declared of a poll at Warrington to decide whether the Corporation should proceed to Parliament for a Bill for the construction of a bridge over the Mersey, river works, and street works; and for powers relating to gas, electricity, land, &c. The opponents of the Bill were in favour of Local Government Board procedure. The Corporation carried both points by large majorities.

New Issues of Gas and Water Capital.—It will be seen, from an announcement which appears elsewhere, that next Tuesday Messrs. A. & W. Richards will offer for sale at the Mart, Tokenhouse Yard, E.C., by order of the Directors, £5300 of 5 per cent. ordinary stock, £10,000 of 5 per cent. preference stock, and £5000 of 4 per cent. perpetual debenture stock of the South Essex Water Company; and on March 22, £5000 of consolidated stock, £6500 of 5 per cent. preference stock, and £3000 of 4 per cent. perpetual debenture stock of the Hornsey Gas Company, also under instructions from Directors.

BOURNEMOUTH GAS AND WATER COMPANY.

Price Reduction and Prosperity.

The Ordinary Half-Yearly Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. G. CRISPE WHITELEY in the chair.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting; and the Directors' report and statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that, for several half years it had been his pleasure and privilege to lay before the proprietors a series of very satisfactory accounts and encouraging reports. In fact, he had almost exhausted his vocabulary in congratulating the proprietors on the position in which they found themselves as a Gas Company. On the present occasion, therefore, as could be imagined, he had additional difficulty in presenting the accounts, because the Company had an increased output, an increased revenue, an increased balance, and a decreased amount of unaccounted-for gas; and they had therefore got beyond, and considerably beyond, what he had ventured to call the record on previous occasions. With this state of things, his first idea would be to be perfectly silent; and to ask the proprietors to carry the accounts and accept the report. To use the language of the present day, the state of the Company's affairs were all "Gains" and no "Losses;" and, as far as the dividend was concerned, "No change." Therefore, if his remarks had been silver in the past, his silence on this occasion would be golden. He would, indeed, be content to paraphrase the well-known epitaph on Sir Christopher Wren, and say: "If you want a monument of the last six months' working, look round at these accounts." It might, however, be well to say a few words as to what had been going on during the past half year. In the first place, he would remind the proprietors of his prophecy—he did not often prophesy from the chair—a year ago, to the effect that, although they had made a reduction in the price of gas, if things went on as they were doing, the Company would soon recover itself, and be able to show a return independent of the loss sustained by the reduction of the price. His prophecy had come true because they had completely recovered themselves before the end of the year. And the question now remained as to how they should deal with the successful accounts before them. It would be noted that, acting on the policy they had adopted for many years, the Directors proposed to give the benefit of the state of affairs to the consumers by again reducing the price of gas. The proposed reduction of 2d. would make a total reduction of 5d. during the last two years; and he thought they would have to go far before they would find a more satisfactory half year, or a more satisfactory state of affairs, than this. The reduction represented on the present output about £14,000 a year. But at the same time he need not say, the Directors would not have attempted to make the reduction if they did not think the accounts fully justified them in taking the step. It was a moot point, he believed, as to how far a reduction in the price of gas brought fresh business; but it certainly would assist the Company and their canvassers, and all their friends at Bournemouth, in meeting the constant conflict they had with electricity. Looking to the future, it was, of course, possible there might be troubles ahead with regard to the coal market; but he might say as to the future cost, it was not likely to be too serious for the Company to deal with on the present accounts and the present successful working. Therefore they would be prepared for any contingency with reference to coal. Nor had they by any means come to the end of the economies in working. Nor had their Engineer and General Manager (Mr. Harold W. Woodall) ceased to promote those reforms which would still further strengthen the Company. He need not say that they had maintained the plant in the highest state of efficiency; and they had carried out, as they were always doing, improvements from beginning to end—improvements that offered themselves in any way, and were valuable. There was one other matter to which he might draw attention—that was, the purchase of the freehold of their properties at Alderney and Longham. He did not want to suggest that these were not perfectly safe before with the long lease they had; but, however safe they might have been with the lease, they were safer still having the fee-simple now in the possession of the Company. When they were dealing with the water supply of a town like Bournemouth, it was very desirable that the property connected with the supply should be absolutely under their own power and control. Therefore he might congratulate the proprietors upon their having possession of all the property in their own hands. This was the short story of the Company during the past six months. If he might be allowed to say so, it was in a sense a triumph for their Engineer and General Manager and his staff, as it was the result of their energetic and enthusiastic work. Knowing their Engineer as they all did, he might say that any position they had gained would not be used as a halting-place, but merely as a vantage ground for further reforms and greater success in the future.

Mr. WILLIAM CASH, in seconding the motion, said there were one or two small matters to which he might refer, and upon which the Chairman had not touched. In the past half year, they had had a certain amount of assistance from the reduction in the price of coal; their new contracts having been entered into on more favourable terms. On the other hand, if reference was made to the statement of coals, it would be seen that they started the half year with nearly 12,000 tons of coal in hand; and they carbonized during the half year more than 20,000 tons. It followed, therefore, they had not had the full effect of the reduction of price. Therefore, should it unfortunately happen that the price of coal should slightly rise again when they made their new contracts in one or two months' time, practically they would be in as good a position as they were in during the past year. The carbonizing results had also been assisted somewhat by the fact that they had to pay rather less for oil than they had to do in the corresponding period of the previous year. The increase in the gas business was extremely satisfactory. It worked out to over 8 per cent. for the half year. This showed the business was growing in lighting, cooking, and heating. Then with regard to the price of gas, it was worthy of note that while they had reduced the price by 5d. in Bournemouth since

1903, they had reduced it 7d. in Poole in the like period, or would have done so with the present reduction. The price in Poole would then be only 2s. 11d., which was a big drop from the figure at which gas was supplied before they took over the undertaking of the Poole Company. The reduction in price would also enable the Directors to do what they always hoped would be a necessary sequence to the scheme inaugurated last year—that was, pay a slightly increased bonus to their co-partners in respect of the year ending June, 1910. When they had received the full benefit of the reduction, the bonus would be considerably more. All these things were carefully thought of and estimated before the reduction was made.

Mr. A. B. BOSHER congratulated the Directors upon the excellent report. He was pleased to see in the report that the price of coal had gone down. In the North, he was sorry to say, they could not hold out much hope that coal was going to be cheaper. If it only remained at somewhere about the price at which it was to-day, they would be very satisfied indeed. The wretched Coal Mines (Eight Hours) Act had been an absolute *bête noir* to the coal trade during the last six months or so; and it had been found that the Act was not wanted by anybody. The great peculiarity was that our statesmen had brought into being something that had been found to be absolutely useless. How long it was going to remain on the Statute Book was a question. He hoped it would be abolished, or, at any rate, amended. The sooner this was done, the better for all users of coal. He noticed that rates and taxes were £4500 for the half year, which he believed was a little more than in the corresponding period of the previous year. Something would have to be done in this matter to protect such concerns as gas, water, and railway companies against this ever-increasing expense. He was glad to say that he believed some action would soon be taken to fight this question; and he hoped it would be successfully fought. He trusted the gas companies would fall into line with the railway companies when this came about.

Mr. GLEN inquired if there were any workmen shareholders yet under the co-partnership scheme, and, if so, how many?

The CHAIRMAN pointed out that they were only just beginning; but several co-partner workmen already held shares.

The SECRETARY observed that the whole of the funds were necessarily placed in shares. The money was held by trustees on behalf of the men until a man had enough to secure a whole share. At the present time, they had about 25 workmen shareholders; and the number would gradually increase.

The motion was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. CASH, dividends were declared, less income-tax, at the rate per annum of 6 and 7 per cent. on the preference and "B" ordinary shares respectively, and 15 per cent. on the original share capital of £50,000.

On the proposition of the CHAIRMAN, seconded by Mr. R HESKETH JONES, Mr. Corbet Woodall was re-elected a Director. The Chairman remarked that Mr. Woodall was one of their best friends, devoting, as he unstintingly did, his great talents and knowledge to the interests of the Company. The Board valued his services very highly indeed.

Moved by Mr. GLEN, and seconded by Mr. BOSHER, Mr. F. G. Barrett, the retiring Auditor, was also re-appointed.

The Standard Burner Bill.

A Special General Meeting of the proprietors was then held to consider, and, if thought fit, approve, the Joint Bill for the substitution of the "Metropolitan" No. 2 burner for testing the illuminating power of the gas in place of the existing standard burner—the Company being one of the body of promoters.

Mr. R. HESKETH JONES, in moving a resolution approving of the Bill, explained that, up to some five years ago, the "London" No. 1 argand was the recognized test-burner, and was almost universally used. Some five years since, Mr. Carpenter produced the "Metropolitan" burner No. 2, which burner was accepted by the Metropolitan Gas Referees, and also by Parliament. Its use had been sanctioned by Parliament in respect of about 80 gas undertakings—both company and local authority. It had been thought by many companies that the new burner should be made still more universal; and the present jointly-promoted Bill was the result. At Bournemouth they had to test their gas by the old Sugg burner; and it had been so far satisfactory that they had no cause to complain. There was no friction whatever between the Company and the local authorities. But it did seem to the Directors that the Company should go in with other companies for power to use what they hoped and believed would become the universal test-burner. No doubt there would be a certain amount of opposition. The Bill had passed the preliminary examination of the authorities of the House of Parliament. The Lord Chairman had passed it; and it was now ready to be introduced into the House of Lords. As to Bournemouth, he was pleased to say their General Manager had, with his usual suavity, approached the Town Clerk, and had explained the Bill to him. The Bill was merely of a formal character, and was not at all likely to cause any friction, or interrupt the good feeling existing between the Company and the Corporation of Bournemouth.

The CHAIRMAN seconded the resolution, remarking that, of course, the local authorities had their eyes open, and were careful to protect the interests of the consumers.

The motion was unanimously agreed to.

VOTES OF THANKS.

Mr. A. W. OKE proposed a vote of thanks to the Chairman and Directors, the officers, and their respective staffs.

Mr. RICHARDS seconded the motion.

The CHAIRMAN first acknowledged the compliment; and he was followed by Mr. WOODALL, on behalf of himself and the Bournemouth staff. Speaking first of co-partnership, he said that practically the whole of the money paid under the scheme has been invested in the Company's shares, or with trustees with the view of ultimately being invested in shares. But quite a considerable amount of money had also been paid in by the co-partners in addition—a large number of the men making a weekly payment from their wages in the hope of getting their shares at an earlier date. He noticed a great desire on the part of the men to maintain the largest amount of money possible with the Company, and to keep increasing it. He was glad to know that proprietors were satisfied with the results of the half year. He might fairly say these excellent results were practically cumulative ones due to the policy of the Directors in building the new gas-works at Poole, and in connection with their Wimborne water supply, because these large works were now coming into full play. But with regard to the satisfactory increase this year, he thought one ought to discount it, seeing that it was an increase that had been shared by nearly every gas company, and had been due to climatic conditions. The winter had been an uncomfortable one; and it had certainly tended to the use of gas-fires during a considerable period. With regard to the Standard Burner Bill, he was glad to feel the Corporation were most friendly towards the Company; and the fact that they were going in with the other local authorities in opposing the Bill was quite a natural proceeding on their part, because when a collection of gas companies went to Parliament in this way, the corporations as a matter of course went also to see what (if anything) they could get, and they might do this in the most friendly fashion.

Mr. PLUMB also briefly responded.

WANDSWORTH AND PUTNEY GAS COMPANY.

Half-Yearly Report and Accounts—Another Reduction in Price.

The accounts for the six months ended the 31st of December last, which will be presented at the half-yearly meeting of the Company to-day (Tuesday), show a gross profit of £15,582. The revenue from the sale of gas was £52,628; from the rental of meters and stoves and the maintenance of incandescent mantles, £10,611; from residual products, £18,965—the total receipts being £82,596. The expenditure on manufacture of gas was £49,066 (coal and oil costing £30,927, and repair and maintenance of plant, £11,951); on distribution, £10,626; on management, £3149—the total expenses being £67,014. After providing, out of the above-mentioned £15,582, for interest on the debenture stock and on deposits and loans, there remains to the credit of the profit and loss account, with the balance brought forward, £20,933 available for distribution. The Directors therefore recommend that dividends should be declared at the statutory rates per annum of £8 2s. 6d. per cent. on the consolidated "A" stock, £6 12s. 6d. per cent. on the consolidated "B" stock, and £5 13s. 9d. per cent. on the ordinary "C" stock. The report closes with an expression of the Directors' pleasure in announcing a further reduction of 1d. per 1000 cubic feet (from 1s. 11d. to 1s. 10d.) as from Christmas last.

GAS SUPPLY IN NORTH LONDON.

At the Meeting of the Southgate and District Gas Company last Thursday, the Directors reported that the sales of gas in the six months ended Dec. 31 last showed an increase of 4,671,800 cubic feet, or 6·21 per cent., compared with those for the corresponding period of 1908. The new retort-house and carbonizing plant, to which reference had been made in a previous report, had been completed and successfully brought into use. Several alterations and additions which had been made to the works had necessitated considerable replacement of the plant, and a correspondingly heavy charge against the revenue account, which had been partly met out of the renewal fund. The accounts accompanying the report showed that the receipts from the sale of 79,892,300 cubic feet of gas were £14,048; and that the total revenue in the half year amounted to £17,197. The expenditure being £13 570, there was a sum of £3627 to go to the profit and loss account, on which there was a balance of £5887 applicable for distribution. The Directors recommended the declaration of dividends at the maximum rates of 5, 10, and 7 per cent. per annum on the preference, original, and additional capital. The payment of these will absorb £2750, and leave £3137 to be carried forward.

The report to be presented at the half-yearly general meeting of the North Middlesex Gas Company to-morrow sets forth that, in comparison with the second half of 1908, the sales of gas in the six months ended Dec. 31 show an increase of 1·8 per cent.; and there was an improvement in the revenue derived from residuals. The quantity of gas sold was 98,141,000 cubic feet, and it brought in £17,074; the total receipts being £21,081. The expenditure in the six months amounted to £15,991; so that there was at the close of the year a balance of £5090 to go to the net revenue account. The amount available for distribution is £7536; and dividends at the rates of 5, 10, and 7 per cent. per annum on the preference, original, and additional capital are recommended. These, with £473 carried to the reserve fund, will amount to £3681, and leave £3824 to be carried forward.

Sale of Stocks and Shares.—Three new issues, by order of Directors, were the outstanding features of the first sale conducted by Messrs. A. & W. Richards this year at the Mart, Tokenhouse Yard, E.C. It took place last Tuesday, when there was an excellent demand for all the stocks and shares offered. The first lots consisted of a new issue of £4000 of "C" consolidated stock and £4000 of 4 per cent. consolidated preference stock of the Aldershot Gas, Water, and District Lighting Company. The "C" stock (5 per cent.) was sold at from £106 15s. to £107 10s., and the preference stock at from £95 to £96 per £100. A new issue of £7500 of 5 per cent. preference stock of the North Middlesex Gas Company fetched from £115 to £116 10s. per £100. The third new issue was by the Southgate and District Gas Company, who offered £5000 of 5 per cent. preference stock and £2500 of additional ordinary stock (7 per cent.). The former was sold at from £113 to £114 10s., and the latter at from £145 to £147 10s., per £100 of stock. By instructions of a private owner, a few £10 fully-paid original ordinary shares in the same Company, carrying 10 per cent. dividend, fetched £21 10s. each.

PROVINCIAL GAS COMPANIES.

Satisfactory Development of Business at Aldershot.

At the recent half-yearly meeting of the Aldershot Gas, Water, and District Lighting Company, the Directors reported that the business is developing satisfactorily; the sale of gas in the six months ended the 31st of December (exclusive of special contracts) showing an increase of 7½ per cent. According to the accounts accompanying the report, the total revenue was £30,537, and the expenditure £22,215; leaving a surplus of £8322. After providing for dividends on the preference shares and consolidated preference stock, and interest on preference stock, mortgage, and debentures, the Directors recommended a dividend at the rate of £12 2s. per cent. per annum on the "A" shares; £9 2s. per cent. per annum on the "B" shares (these rates being in accordance with the sliding-scale); £7 per cent. per annum on the "E," "F," and "G" ordinary shares; and £5 per cent. per annum on the "C" consolidated stock for the past half year; also a dividend at the rate of 3s. per cent. per annum on the "A" and "B" shares for the six months ended June 30, 1909—all less income-tax. The Chairman (Mr. A. F. Wilson), in moving the adoption of the report, said the revenue of £30,537 compared with £31,230 for the second half of 1908; and he explained at some length the cause of the difference. The total expenditure was £22,215 against £23,441; but in connection with their new Act they had paid £530 on account of opposition, and they had put £1566 to a special purposes fund, which the Act gave them power to create. Had it not been for these two items, the expenditure would have been only about £20,100. There was a balance of £8322, compared with £7788 for the corresponding half of 1908, which was amply sufficient to pay the dividends recommended. As their Chairman, he felt convinced that the accounts of the Company were in a sound condition; and they showed that a considerable amount of progress had been made in relation to the actual consumption of the principal part of their revenue—viz., that derived from gas. They were now supplying the new balloon factory at Farnborough; and the Directors had hopes that gas would be used also for power purposes. The Chairman concluded by announcing his intention of resigning his position, but said he would be happy to remain an ordinary member of the Board. The report was unanimously adopted. The dividends were declared, and a vote of thanks was accorded to the retiring Chairman and the staff of the Company, which was duly acknowledged by Mr. Wilson and Mr. R. W. Edwards, the General Manager and Secretary.

A Satisfactory Position at Annfield Plain.

The report that was submitted at the general meeting of the Annfield Plain and District Gas Company, which was held last Wednesday, at No. 50, Cannon Street, E.C., showed that the undertaking had continued to make steady progress. The accounts dealt with a period of twelve months to Dec. 31 last; and the net profit amounted to £2000, as compared with £1452 for the previous nine months. Dividends at the rate of 5 per cent. were declared both on the preference and on the ordinary capital; and after placing £196 to the reserve fund, a balance of £113 remained to be carried forward to next year. The number of consumers increased during the year by 294; there being at Dec. 31 2103 consumers, as compared with 852 when the Company acquired the undertaking in March, 1908. In moving the adoption of the report and accounts, the Chairman (Mr. W. A. Schultz, F.C.A., J.P.) said the output of gas during the twelve months had been 27,662,000 cubic feet, against 20,736,000 feet in the nine months covered by the previous accounts, or an increase of 6,926,000 feet. The quantity sold was 21,305,000 cubic feet, as compared with 14,023,000 feet, or an increase of over 50 per cent. The difficulty which all companies in mining districts had to deal with was in regard to the leakage; and this, he was pleased to say, had in their case been reduced by a matter of 7½ per cent. The sale of gas (including public lighting) had produced £4345, against £2982; while the total revenue had been £5563, compared with £3774. They had had some little trouble to contend with during the year in regard to the supply of coal, consequent on the difficulties among the Durham miners; but the only additional expense they had been put to was the extra cost of carting, owing to their having to get supplies from a colliery that was farther off. Looking towards the immediate future, the only capital expenditure probable would be in respect of extensions of mains and services and the addition of a sulphate plant and house, now being erected. While alluding to the question of capital, however, he ought to mention that the Burnopfield works on the north of the district (which they had had to buy) were still being carried on independently of the two works at Kyo and Dipton. When, however, they were able to link up the whole of the district, there would in all probability be a large increase in the output of gas, as there were many houses waiting to take a supply. The Directors were desirous that the local people should come forward and take up capital. When they did this, the Board would be in a position to consider a linking-up scheme, which would make the shares more valuable; and there would no doubt be a dividend of 7 per cent. on the ordinary capital. Such a scheme would not, however, be undertaken until the Company could afford it. At present, the capital expenditure stood at £15 per 1000 cubic feet of gas made; and considering that the Company was so young, and that the outlay provided a much greater manufacturing capacity than was now required, this was not an unsatisfactory figure. After the report had been adopted and the dividend declared, the retiring Directors (Mr. Charles Comins and Mr. W. C. Parkinson) and the Auditors (Messrs. Davies Bros.) were re-elected. The Managing-Director (Mr. C. Comins), Secretary (Mr. W. H. Kent), Manager (Mr. C. L. Ireland), and staff were thanked for their services. In response, Mr. Comins said he considered the Company had in Mr. Ireland an exceedingly capable officer. He had had many difficulties of a special character to contend with; and the accounts proved that he had dealt with the situation successfully. Mr. Kent, who had succeeded to the office of Secretary, had also fulfilled his duties to the satisfaction of everyone who came in contact with him. A vote of thanks to the Chairman and Directors brought the proceedings to a close.

Progress at St. Austell.

The St. Austell Gas Company continue to more than hold their own in the competition which they have to meet. In the year ended Dec. 31, there was an increase of 45 consumers and of 875,000 cubic feet in the quantity of gas sold—a very creditable result in the circumstances governing the district. Considerable improvements have been carried out at the works, including the installation of a washer scrubber and the widening of the retort-house. The price of gas was reduced at Midsummer, and a sliding-scale of discounts introduced. The profit and loss account showed a balance of £772; and out of this it has been decided to pay a dividend of 8 per cent., to put £100 to the reserve fund, and to carry forward a balance of £31.

Improved Relations at Coatbridge.

At the recent annual general meeting of the Coatbridge Gas Company, at which Mr. James Johnston, J.P., the Chairman of the Company, presided, the Directors reported that, with one exception, the accounts for the six months ended the 31st of December were satisfactory. The consumption of gas amounted to 91,234,917 cubic feet; being an increase of 2,934,824 cubic feet on that of the corresponding period of 1908; the gas lost by leakage was 5·45 per cent., against 5·16 per cent.; and the average illuminating power had been 20·46 standard candles, though the Company had the right, since the 21st of September, to reduce it further. There had been increases of 58 in the number of ordinary and prepayment consumers, and 158 in cooking and heating appliances let out on hire. The gross revenue amounted to £15,825, and the expenditure to £12,660; while the capital expenditure had been £486. Maintenance, renewals, and depreciation had been amply provided for, at a total cost of £2037 18s. 4d. The Directors expressed regret that the cost of the Provisional Order of last session, which they did everything possible to avoid, should have amounted to £1793; but as the accounts had been paid, they hoped the shareholders would only look upon the outlay as an unpleasant memory. They recommended the payment of dividends at the rate of 11½ per cent. per annum on the original stock, and 8$\frac{1}{20}$ per cent. per annum on the three issues of £10 shares, less income-tax. The Chairman, in moving the adoption of the report, and the declaration of the dividends recommended, said the Directors had every reason to be satisfied with the present position of the Company. It was to be regretted that such an outlay had been incurred in connection with the promotion of the Provisional Order, which had been granted. They had always been on the most friendly terms with the Town Council; and now that their little differences had terminated, he had no doubt their relations would be of a satisfactory nature. The motion was seconded by ex-Provost Sharp, J.P., and unanimously agreed to. The retiring Directors and Auditor having been re-elected, ex-Provost Sharp moved that the Secretary (Mr. W. Johnston) be instructed to record in the minutes a special appreciation of the services of the Chairman in connection with the promotion of the Provisional Order. Mr. Johnston had not spared himself, at the three inquiries held in London, in his endeavours to put the facts, as they affected the interests of shareholders and consumers alike, before those who had to decide on the merits of the case; and it was to his painstaking efforts that they had to lay a great deal of the credit for the success they had achieved. Mr. Peter Barclay endorsed these remarks in seconding the motion, which was carried with enthusiasm. The meeting terminated with a vote of thanks to the Directors and the management for their services, and also to the Chairman for presiding; the Chairman returned thanks for the acknowledgment of his personal services and of those of his colleagues.

Reduction in Price at Derby.

The report submitted at the meeting of the Derby Gas Company last Friday stated that the gross profit for the year to Dec. 31 last, less interest on bank account, amounted to £43,621, which, after deducting the interim dividend for the June half year, interest on debenture stock and deposits for the whole year, and also income-tax, left a balance of £27,581. This, with the balance of £2691 brought forward from last year, made a total sum of £30,272 available for dividend. The Directors recommended the payment of the standard rate of dividend on the consolidated stock at the rate of 5 per cent. per annum for the half year ending December, with an additional ½ per cent. for the whole year—making 5½ per cent., less income-tax. The rental showed an increase in the sale of gas, and also that a considerable saving in the cost of production had been effected. Satisfactory prices for residual products had been obtained. The purchase of the Belper Gas and Coke Company's undertaking had been completed; and there was a marked increase in the consumption of gas in the added area. A steady increase in the use of prepayment meters, gas-fires, and cooking-stoves had continued throughout the year. In moving the adoption of the report, the Chairman (Colonel Gascoyne) remarked that the results of the working were not less satisfactory than those of the previous year. Coal, which was always by far the largest item of expenditure, had cost £45,191, compared with £47,300; being a decrease of £2109, though they had carbonized almost 2000 tons more, and made nearly 40 millions cubic feet of gas more. The saving in coal was mainly due to lower prices. Purifying showed a reduction of £1127, due entirely to the installation of new purifiers and the substitution, to a large extent, of oxide of iron for lime. Carbonizing expenses totalled up to £6408. This was a reduction upon the previous year, due solely to improvements in the system of charging the retorts, whereby they were more perfectly filled. The results were much better, both in regard to the quantity and quality of the gas produced, and also the residual products; and it was expected that the results might be yet further improved. The total cost of manufacturing all the gas for the year, including the charges for purifying, for salaries, for carbonizing, for repairs, and maintenance, and all the expenditure for renewals, amounted to only £670 more than the previous year. This satisfactory position was eminently due to the installation of up-to-date plant, and modern processes, for which the shareholders were mainly indebted to the industry and ability of their Engineer and Manager, Mr. J. Ferguson Bell. The receipts from sales of gas, at £102,381, were £5949 more, mainly owing to the addition of the Belper and Milford districts. This, he thought, was most satisfactory, in face of the bad state of trade. There was also an item on the credit side of the accounts which had not appeared

before. The Company's waggons had earned £763. Some years ago, the Board purchased 50 twelve-ton waggons in order to carry coal from the collieries in their own waggons, instead of paying 6d. per ton for the hire of colliery company's waggons. The cost of these waggons had been gradually paid off, and their earnings now appeared as revenue. The Directors were always anxious the consumers should participate in the prosperity of the undertaking. Since the introduction of the sliding-scale, the consumers had become, as it were, partners in the concern; and the Board were fully alive to the desirability of selling gas at the lowest price consistent with the meeting of their engagements. The possibility of giving effect to these ideas, was afforded by the adoption of a bold and enterprising policy, by the incorporation of outlying concerns, and by their inclusion under one central administration. This course had been adopted; and the Directors now considered that they could see their way to a reduction in the price of gas. It was impossible to foretell the future; but if the Company remained unaffected by outside interference, or by imposition of unexpected burdens, there seemed a reasonable probability of their being able to make the reduction permanent. The Directors had authorized a reduction in the price of gas of 2d. per 1000 cubic feet to the great bulk of the household consumers; and this reduction would apply, not only to the central area, but to the outside districts as well. In the case of those customers who use prepayment meters there would be a reduction in all the districts of 4d. per 1000 cubic feet. This reduction of 2d. per 1000 feet would also be made on the initial price of gas for power. As regarded the consumers who take large quantities of gas which already brought them under a lower scale, they had a very substantial reduction some three years ago. The proposed concessions would cost the Company about £6000 per annum. It was calculated that out of the 28,475 consumers now on the books more than 27,000 would benefit to the extent of 2d. per 1000 feet on their gas bills. The reductions would commence in the quarter succeeding March next. In seconding the motion, Alderman Newbold pointed out that the concessions meant the reduction of the price of gas from 2s. 6d. to 2s. 4d. per 1000 cubic feet in Derby, and from 2s. 10d. to 2s. 8d. in the outside area. The report was adopted, the dividend recommended was declared, and the Chairman, Directors, Engineer, Secretary, and staff were thanked for their services. In responding for the staff, Mr. Bell referred to the question (mentioned by the Chairman) of the danger of the water-slide chandelier, and explained that it had already been decided by the Board to convert all such chandeliers, without any expense whatever to the consumer, so as to prevent possible explosions.

Increased Capital Sanctioned at Salisbury.

At the half-yearly meeting of the Salisbury Gas Company last Wednesday, the Chairman (Mr. George Fullford), in moving the adoption of the report and statement of accounts for the six months ended Dec. 31, and the payment of the usual dividends, directed attention to several items in the accounts, and said that though the Company did not go in for large or extensive schemes of improvement, they spared no pains in the utilization of any novelty that promised a reduction in working costs. The new retort-house erected last year, for example, enabled them to economize in more than one direction. The same might be said with regard to the new purifiers. As compared with other companies of similar size and circumstances, they were able to sell gas cheaply, and to give an article of excellent quality. They secured this result by careful attention to financial matters in buying and selling, and especially by keeping the capital outlay moderately low. It was easier to pay interest on a capital of £50,000 than on one of £80,000 or £90,000. At the same time, they did not hold back when outlay was really necessary, and they were always prepared to consider the requirements of growing and increasing districts. The sales of gas were increasing; and the whole of the plant was maintained in good order. Mr. W. Young seconded the motion, which, after some discussion on the accounts, was carried unanimously. A special meeting was then held at which the Directors were authorized to raise £2000 of additional capital, to provide for the needs of the Company's extending business. A vote of thanks having been accorded to the Chairman, Directors, and staff of the Company, Mr. S. R. Atkins responded on behalf of the Board, and Mr. Norton H. Humphrys, the Engineer and Manager, expressed the acknowledgments of the staff for this recognition of their work.

Steady Expansion of Business at Wellington (Salop).

The annual general meeting of the Wellington (Salop) Gas Company was held last Tuesday—Mr. H. Shepard, the Chairman, presiding. The report presented by the Directors showed that the revenue in the past year amounted to £9356, and the expenditure to £7243; leaving a surplus of £2113. The profit and loss account, after allowing for mortgage and debenture interest and an interim dividend at the rate of 5 per cent., showed a credit balance of £3257; and the Directors proposed to pay a dividend for the six months ended Dec. 31 at the rate of £5 13s. 4d. per cent., free of income-tax—making £5 6s. 8d. for the year, and leaving £2040 to be carried forward. The Directors stated that the Company's business continues steadily to expand; the sale of gas during the year showing an increase of 3½ per cent. In moving the adoption of the report and balance-sheet, the Chairman gave a *résumé* of the history of the Company, and said he thought the shareholders might congratulate themselves on the position the undertaking now occupied. The Directors were doing their best to keep the property up to the mark and increase the dividends legitimately. Under their new Act, they had a sliding-scale, so that they could do nothing wrong; and he and his colleagues had not a single regret in going to Parliament for new powers. It had placed them among the first-class companies in the country. Mr. C. W. Leake seconded the motion; and it was carried. The retiring Directors and Auditors having been re-elected, a vote of thanks to the Directors and also to the Manager (Mr. H. J. Woodfine), for the able way in which the affairs of the Company had been conducted during the past year, was carried by acclamation. At the conclusion of the meeting, the Directors and shareholders made an inspection of the works. The new plant which has been put in was pointed out and explained by the Manager to the assembled proprietors.

Satisfactory Year and Reduced Price at Scarborough.

At the annual meeting of the Scarborough Gas Company on the 12th inst., the Directors reported a continued satisfactory increase in the sale of gas in the past year; nearly 6½ million cubic feet having been sold more than in the year 1908, notwithstanding a reduction of almost 3 millions in the public lighting. The accounts showed a sum of £10,103 applicable for distribution; and the Directors recommended the payment of a dividend at the rate of 5 per cent. per annum for the six months ended Dec. 31 (less income-tax)—making, with the interim dividend 5 per cent. for the year. This will leave a balance of £3515 to be carried forward. The Directors announced their intention of reducing the price of gas by 2d. per 1000 cubic feet to the ordinary consumers in Scarborough, and by 3d. per 1000 cubic feet to those in Newby and Scalby; these reductions to take effect after the end of the present quarter. The Chairman of the Company (Mr. B. Fowler) was unable to preside on account of his health; but he wrote to the effect that the shareholders should be satisfied with the year's operations. The balance-sheet did the Secretary and Manager (Mr. A. Allan) credit, as without his care and hard work the result shown could not have been attained. Mr. W. S. Rowntree, who occupied the chair, read a statement prepared by Mr. Fowler. He congratulated the shareholders on the financial position of the Company, as shown by the accounts, and mentioned that the number of consumers continued to increase—235 being added during the past twelve months, bringing up the total to 10,727. The total income was £53,243, against £54,311 in 1908—a decrease of £1068. On the expenditure side, the cost of manufacture was £150 in excess of the corresponding year—chiefly due to the larger quantity of coal carbonized and the higher price paid for it during the first half of the year. The balance carried to the profit and loss account was £16,033, compared with £17,267 in 1908. The surplus brought forward was £3591, to which was added interest on investments, bank interest, and the balance on the revenue account; making a total of £20,295. Allowing for interest on mortgages and the interim dividend paid in August, the balance remaining on the profit and loss account was £10,103. The payment of the usual dividends would absorb £6588; leaving a surplus of £3515 to be carried forward. Mr. Fowler then referred to the reduction in price which the Directors had decided on making, as stated in the report, and concluded by referring to the appreciation by the consumers of the advantages of gas for heating purposes, as evidenced by the larger number of gas-fires sold by the Company. The Chairman moved the adoption of the report and accounts; and the motion was carried. The dividend recommended having been declared, the retiring Directors and Auditor were re-elected; and the meeting concluded with votes of thanks to the Directors and staff. A special meeting was subsequently held, at which the shareholders expressed their approval of the Standard Burner Bill, in the promotion of which the Company have joined.

A Record Year at Uxbridge.

The report presented at the ordinary meeting of the Uxbridge Gas Company last Thursday showed that the net profit on the working in the past year was £6756, and that there was a sum of £6023 available for distribution. The Directors therefore recommended the payment of a dividend of 5½ per cent. (less income-tax) on the consolidated stock, which would leave a balance of £25 to be carried forward. The progress of the Company was shown by the fact that the sale of gas increased by 11 per cent. in the year; while 243 services and 304 slot-meters were added to those previously in use. The Chairman (Mr. H. E. Jones), in moving the adoption of the report, said he might state with confidence that the Company never had better accounts to place before the shareholders. The report showed the sale of gas had increased by 11 per cent., which was a very large increase over the previous year. The Directors were enabled to recommend a dividend of 5½ per cent., and to do so with the knowledge that they were making the fullest allowance for the maintenance and upkeep of the works, plant, and buildings as well as mains and service-pipes. Mr. W. B. Fassmidge seconded the motion. Mr. A. Bailey said the accounts were very satisfactory from every point of view; and, as shareholders, they were perfectly satisfied with 5½ per cent. under the present conditions. He was pleased to hear that there had been no cheeseparing or starving by the manner in which the mains and services and general upkeep of the works had been maintained. The report was adopted. The retiring Directors and Auditor having been re-elected, the Chairman, alluding to the work of the Secretary (Mr. G. J. Bristow), said his duties had been carefully and thoroughly carried out. Mr. Bristow showed such capability, diligence, and loyalty in their service, that they had voted him, subject to the approval of the shareholders, an increase of 10 per cent. They had not neglected their Engineer and Manager (Mr. Charles Hulme), and had voted him a similar increase. The shareholders unanimously agreed to the proposal. An extraordinary general meeting was then held at which the Directors were authorized to raise £20,000 of additional capital; and the proceedings closed with a vote of thanks to the Directors, officers, and staff to which the Chairman, Mr. Hulme, and Mr. Bristow briefly replied.

Increased Make per Ton at Wakefield.

At the 126th ordinary half-yearly meeting of the Wakefield Gaslight Company, which was held at the Company's Offices on Monday last week, the Chairman (Dr. W. A. Statter, J.P.), in moving the adoption of the report, congratulated the shareholders upon the satisfactory nature of the balance-sheet and accounts. He pointed out that the gas sold increased during the half year by 2·45 per cent.; and also that, for the first time, all the gas had been made in regenerative retort-settings, and that, as a consequence, the quantity produced per ton—11,215 cubic feet—was the highest in the history of the Company. This showed that the modern plant was on the right lines. The Chairman likewise directed attention to the fact that the gas burnt during the Christmas week broke all previous records for a week's consumption. The report having been adopted, cordial votes of thanks were given to the Chairman and Directors, in acknowledging which Dr. Statter proposed a hearty vote of thanks to the staff; and it was suitably acknowledged by the Engineer and Manager (Mr. H. Townsend), and the Secretary (Mr. R. B. Wilson).

GAS COMPANIES (STANDARD BURNER) BILL.

Further Resolutions to Oppose.

The question of opposing the Bill promoted to obtain sanction for the substitution of the "Metropolitan" No. 2 burner for the various burners used for the official testing of gas was considered by several local authorities last week; the views expressed in all cases being very similar.

Plymouth.

The Mayor of Plymouth (Mr. John Yeo) presided at a meeting of the Corporation yesterday week, and moved the adoption of the report of the Special Purposes Committee, who, as mentioned in the "JOURNAL" on Tuesday last, recommended that the Bill should be opposed. He said it was a grievance with traders that the illuminating power of the gas in the borough was low; and if it were reduced as a consequence of the adoption of the new burner, they would have a still worse light, while householders would have to burn more gas not only for lighting, but for heating and cooking. The effect of the Bill might be to reduce the price of the gas; but the Companies which had combined to promote it had forgotten to include this in it. Mr. Munday pointed out that the proposed burner was now invariably prescribed as the test-burner in all Gas Acts and Provisional Orders granted to companies and corporations; while as to the question of price, if there was any additional profit to the Gas Company, the consumers would, under the sliding-scale, get four-fifths of it. Alderman Woollcombe said the objection was not to the mode of testing the gas. What they wanted to ensure was that the gas supplied should not be of less illuminating power than was the case at present. Therefore, instead of asking, as the Special Purposes Committee did, that Plymouth should be excluded from the Bill, he thought that they should endeavour to secure such a difference in the test as would adjust the illuminating power to the new conditions. The resolution was agreed to.

Exeter.

In accordance with the decision come to at their meeting on the 10th inst., as reported in the "JOURNAL" last week (p. 451), a special meeting of the Exeter City Council was held on Wednesday last to consider the question of joining other authorities in opposing the Bill. Mr. Munro having moved a formal resolution sanctioning this course, and Mr. C. J. Ross having seconded it, Mr. F. T. Depree (Chairman of Messrs. Willey and Co., Limited) moved, as an amendment, that the matter be referred back to the Committee. He pointed out that the proposed new standard burner was selected by the Metropolitan Gas Referees some time ago. The whole of the London Gas Companies, and a large number of those in the Provinces, used it. A great many of those present did not understand the gas question. They must take into consideration the wonderful change that had come over gas since the introduction of the incandescent mantle. With an ordinary burner, if they did not get a light of 18-candle power it was not particularly bright; but from a 14-candle power burner with an incandescent mantle, they now obtained a much better light. This being so, it was a question whether the maintenance of an 18-candle standard was not putting pressure on gas companies without any benefit to the consumer. The 14-candle gas in Exeter was, for lighting and motive power purposes, a little better than the 18-candle gas; and if they could get a better result through the incandescent mantle than before, it seemed a pity to challenge the action of the associated gas companies. The Exeter Company had offered a reduction of 2d. per 1000 cubic feet in the cost of gas; and in face of this, the Council were immediately going to take action against them. The Company had been of some benefit to the city; and certainly the gas industry had. It was possible, if the Council were going to oppose them, the Company might not see quite eye to eye with them in future—though he did not say this would necessarily follow. At the same time, he submitted that, in spending money over an imaginary grievance, they were not doing what was right. Mr. Glanfield seconded the amendment. He said the object of the new burner was rather to lessen the cost of gas production; and if they did this, the companies must necessarily be in a position to supply gas at a cheaper rate. The Council, as a public body, ought not to oppose the Bill. If they wanted concessions from the Gas Company, and they were reasonable, they might get them. Mr. Hodson also supported the amendment, remarking that he could not see the slightest use in carrying the recommendation. Why should they fight the Company when they had no grievance? Mr. Campion pointed out that if gas companies were allowed to adopt the new standard burner for testing purposes, it would reduce the quality of gas by nearly 2 candles, which meant that the illuminating power in Exeter would be brought down to just over 12 candles, instead of 14. They had to consider the small consumer. After some further remarks, the motion was carried.

Resolutions to oppose the Bill have also been passed by the Corporations of Bootle, Shrewsbury, and Swansea, and by the Urban District Councils of Caversham (Reading) and Twickenham.

Sunderland and South Shields Water Company.—At the annual meeting of the Company last Thursday, the Directors reported an increase of £1305 in the revenue from water-rents in the past year compared with 1908; it being £100,164, against £98,859. The amount carried to the profit and loss account was £46,542; and the balance on this account was £32,093. The total dividends declared for the year were £9, £6 6s., and £4 10s. per cent. (free of income-tax) on the various stocks.

Radcliffe's Spent Liquor Purification Process.—The Cambuslang Gas Company have given an order for sulphate of ammonia plant to the Chemical Engineering Company, and also to Mr. John Radcliffe, of East Barnet, for purification plant for the spent liquor. The latter process was described in an article which appeared in the "JOURNAL" on Oct. 2, 1906 (p. 22); but we learn that since then Mr. Radcliffe has made certain improvements. There are now no costs for labour or materials; the working being automatic and continuous. The system was installed some time ago at the St. Albans Gas-Works; and after being in operation for nine months, Mr. A. F. Phillips stated that it was continuing to work satisfactorily.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 492.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Oct '14	5	Alliance & Dublin Ord.	86 88	..	5 13 8
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	98-100	..	4 0 0
200,000	5	Oct. 28	6½	Bombay, Ltd.,	6-6½	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4⅜-4¾	..	5 6 8
50,000	10	Aug. 26	15	Bourne-mouth Gas & Water Pref. 6 p.c.	29½-30½	..	4 18 4
311,810	10	,,	7		10⅜-17½	..	4 1 2
75,000	10	,,	6		15⅝-15⅞	..	3 16 2
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	250-259	..	4 16 6
300,000	,,	,,	9⅜	Do. New	192-194	..	4 17 11
50,000	,,	,,	5	Do. 5 p.c. Pref.	120-122	..	4 2 0
206,250	,,	Dec. 29	4	Do. 4 p.c. Deb.	101-103	..	3 17 8
220,000	Stk	Sep. 10	11	Brighton & Hove Orig.	218-221	..	4 19 7
246,320	,,	,,	8	Do. A Ord. Stk.	154-157	..	5 1 1.
460,000	20	Oct. 14	10	British	42⅛-43⅛	..	4 11 11
109,000	Stk.	Aug. 26	6	Bromley, A 5 p.c.	119-121	..	4 19 2
165,700	,,	,,	4½	Do. B 3½ p.c.	89-91	..	4 18 11
82,278	,,	,,	5½	Do. C 5 p.c.	106-108	..	5 1 10
55,000	,,	Dec. 29	3½	Do. 3½ p.c. Deb.	87-89	..	3 18 8
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	14⅞-15⅛	+⅛	4 11 10
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	95-100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	3-4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅛-5⅜	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48-49	..	6 2 6
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	80-82	..	5 9 9
157 150	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	108⅛-110½	..	4 10 6
1,513,280	Stk.	Aug. 26	5⅝	Commercial 4 p.c. Stk.	109-111	..	4 13 8
560,000	,,	,,	5	Do. 3½ p.c. do.	105-107	..	4 13 6
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81-83	..	3 12 3
800 000	Stk.	Dec. 10	5	Continental Union, Ltd.	95-97	..	5 3 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	137-139	..	5 0 9
492,470	Stk.	—	5	Derby Con. Stk.	121-123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103-105	..	3 16 2
143,995	,,	Oct. 2	5	East Hull 5 p.c. Ord.	98-100	..	5 0 0
486,093	10	Jan. 27	12	European, Ltd.	21⅛-24⅜	+½	4 17 0
354,060	10	,,	12	Do. £7 10s. paid.	18⅛-18⅜	..	4 16 0
15,141,545	Stk.	Feb. 10	4⅜	Gas light & Coke Ord.	104⅛-105⅛*	+1	4 8 5
2,600,000	,,	,,	3⅜		87-80*	..	3 18 8
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	103-105¹	+1	3 16 2
4,193,975	,,	Dec. 29	3	Coke 3 p.c. Con. Deb.	81-83	..	3 12 3
258,740	Stk.	Sep. 10	5	Hastings & St. L. 3½ p.c.	95-97	..	5 3 1
82,500	,,	,,	6½	Do. do. 5 p.c.	119-121	..	5 7 5
70,000	10	Sep. 29	11	Hongkong & China, Ltd.	17⅛-18	..	6 2 3
131,000	Stk.	Sep. 10	6½	Ilford A and C	145-147	..	4 8 5
65,782	,,	,,	5	Do. B	108-110	..	4 10 11
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.	100-102	..	3 18 5
4,940,000	Stk.	Nov. 11	8	Imperial Continental	175-177	..	4 10 5
1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	92-94*	..	3 14 6
195,242	Stk.	Aug. 26	6	Lea Bridge Ord. 5 p.c.	120-122	..	4 18 4
561,000	Stk.		10	Liverpool United A	227-229	..	4 7 4
718,100	,,	,,	7	Do. B	16'-16⅞	..	4 2 10
306 083	,,	Dec. 29	4	Do. Deb. Stk.	103-105	..	3 16 2
75,000	5	Nov. 26	6	Malta & Mediterranean	4⅞-5	..	6 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb	99-102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100-102	..	4 8 3
541,920	20	Nov. 11	3¼	Monte Video, Ltd.	12⅞-13⅛	..	5 5 8
1,775,892	Stk.	July 29	4⅛†	Newc'tle & G'tesh'd Con	108-109	+½	4 0 3
529,435	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91-93	..	3 15 3
55,940	10	Aug. 26	7	North Middlesex 7 p.c.	13⅝-13⅞	..	5 3 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd.	138-140	..	5 14 4
60,000	5	Sep. 10	8	Ottoman, Ltd.	6⅛-6⅜	..	6 5 6
31,800	53	Aug. 26	13	Portsea Island A.	137-139	..	4 19 0
60,000	50	,,	13	Do. B.	129-131	..	4 19 3
100,000	50	,,	12	Do. C.	122-124	..	4 16 9
114,800	50	,,	10	Do. D and E.	102-104	..	4 16 2
398,490	5	Oct. 28	7	Primitiva Ord.	7⅜-7⅝	+⅛	4 8 11
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	5⅝-5⅞	+⅛	4 8 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	98-100	..	4 0 0
1,900,000	10	Oct 14	8	River Plate Ord.	17½-18	+¼	4 8 11
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	99-101	..	3 19 3
250,000	10	Sep. 29	8	San Paulo, Ltd.	14⅜-15⅛	..	5 4 11
62,500	10	,,	6	Do. 6 p.c. Pref.	11⅛-12⅝	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	50-51	..	4 18 0
135,000	Stk.	Sep. 10	10	Sheffield A	233-235	..	4 5 1
209,984	,,	,,	10	Do. B	233-235	..	4 5 1
523,500	,,	,,	10	Do. C	233-235	..	4 5 1
70,000	10	Oct. 14	10	South African	12⅛-12⅜	..	7 16 11
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	119-121¹	..	4 10 4
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	82-84	..	3 11 4
209,820	Stk.	Aug. 26	8	South Shields Con., Stk.	161-162	+½	4 18 9
605,000	Stk.	Aug. 12	5⅜†	S'th Suburb'n Ord. 5 p.c.	122-124	..	4 11 3
60,000	,,	,,	5	Do. 5 p.c. Pref.	121-123	+1	4 1 4
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	121-123	+1	4 1 4
502,310	Stk.	Nov. 11	5	Southampton Ord.	110-112	..	4 9 3
120,000	Stk.	Feb. 10	6⅞	Tottenham A 5 p.c.	133-135¹	..	5 1 9
453,940	,,	,,	5⅜	and B 3½ p.c.	111-113¹	+1	4 15 2
149,470	,,	Dec. 29	4	Edmonton 4 p.c. Deb.	98-100	..	4 0 0
102,380	10	Dec. 29	8	Tuscan, Ltd.	9⅛-9⅜	..	8 4 2
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99-101	..	4 19 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p c max.	113-115	+1	4 6 11
255,656	Stk.	Aug. 26	6½	Wands- worth B 3½ p.c.	141-144	..	4 12 0
79,416	,,	Dec. 29	3	3p.c. Deb. Stk.	74-76	..	3 18 11

Prices marked * are "Ex div." † Next dividend will be at this rate.

THE CORNER IN THORIUM.

Writing on this subject in yesterday's issue of the "Financial Times," a correspondent said: "Much interest is being taken in the fight being waged between the Thorium Syndicate on the Continent and certain other producers, who are also consumers of the commodity. As an illustration of 'trust busting,' the story is interesting. The great increase in the demand for incandescent mantles led a number of producers of thorium on the Continent to endeavour to corner the supplies; and they succeeded so well that ultimately every independent producer had been compelled or cajoled into falling in line with the Syndicate, or disposing of their businesses to it. The Thorium Syndicate then advanced prices by fully 100 per cent.—to between 32 marks and 40 marks per kilogramme. Master of all the available supplies of this most important raw material, the Syndicate used their powers so dictatorially that the mantle manufacturers felt themselves compelled to endeavour at all hazards to secure independent supplies. The first serious competition to the Syndicate was the acquisition of 7000 tons of monazite sand at Wissensee by the German Incandescent Gas Company. Then Vienna and Hamburg firms succeeded in acquiring considerable quantities of the sand; and last year the Welsbach Incandescent Gas-light Company purchased the Atzgersdorf thorium works, and reduced the price of thorium nitrate to 22 marks, and subsequently to 16 marks per kilogramme, though the cost price was estimated at about 18 marks. In the course of a few days, the Welsbach Company had sold a quantity equal to a quarter of the world's annual consumption, and then raised their prices; the Syndicate being forced to reduce their quotations to the same level as their competitors. It is reported that the Syndicate are now endeavouring to come to some arrangement with their competitors, with the view of raising prices to the previous high level."

THE DOMESTIC USES OF GAS.

Lecture by Mr. Walter Grafton.

The second of the series of lectures arranged by the Gas Department of the Corporation of Glasgow, with the view of enlightening the public on subjects bearing upon the checking of air contamination by smoke—the first of which, by Mr. A. Wilson, the Gas Engineer, was noticed in the "JOURNAL" last week (p. 439)—was delivered last Wednesday night by Mr. Walter Grafton, the Assistant Gas Manager, in the Springburn Hall, Glasgow. The subject was "The Domestic Uses of Gas," and it was illustrated by about 90 lantern slides.

The lecturer pointed out that the aim of the department was not only to sell a low-priced gas to the consumer, but to enable him to get the most effective light, heat, and power from it. He emphasized the need for having distribution show-rooms as a means (if they were judiciously managed, and the staff were technically trained) of educating customers in the use of their gas appliances. He said that he considered all properties, especially new ones, should be fitted up with iron piping under the flooring of the rooms to be supplied with gas, instead of running the pipes overhead, as was done now—a method which at times was most inconvenient for the tenant above. The ordinary soft pipe (compo.) was detrimental to the gas supply, since it was readily crushed, and thereby had its gas-carrying power reduced.

With regard to light for reading, Mr. Grafton said that from 2 to 3 candle-feet were necessary for the comfortable illumination of printed matter; but if the volume of light was 6 candle-feet and upwards, the brilliancy was painful and fatiguing to the eyes. The aim should be to reproduce in the dwelling the soft diffused light of day. Dealing with the fallacy of bad light from gas, the lecturer showed by demonstration that a rich gas consumed with an incandescent mantle produces less light than when the quality is only 14 candles. He said the parliamentary standard of Glasgow gas was 16 candles; but the reports of the City Analyst showed that it was from 2 to 4 candles higher. A bad light might be due to defective pipes, antiquated burners, or incandescent burners which had become choked with dust, &c. The slight advantage which electricity had over gas lay in the convenience of lighting and extinguishing lamps; but it had become less pronounced since the introduction of the pneumatic switch, spark ignition, and other devices for lighting gas at a distance. An interesting demonstration was given with a small ventilating fan worked by the combustion of gas, which showed that heat produces not only light but power. It was stated that the cost of working this apparatus was about 1d. for 24 hours.

Turning to the subject of the movement for the purification of air, the lecturer pointed out that it was a matter as much for the citizen as for the Corporation to deal with. If householders would only realize that for every ton of coal they burnt, they were sending upwards of 1 cwt. of noxious gases into the air, they would soon adopt and utilize fuels other than smoky coal; and this would put a stop to the wasteful practice of polluting the atmosphere. It was one of the paradoxes of life that while many people were most careful about not drinking polluted water, they were willing to breathe polluted air, forgetful that one was quite as dangerous to their health as the other. Tobacco smoke gave off more carbon monoxide than gas did—a fact which few people would credit when they entered the smoking compartments of trains and tramcars. Mr. Aitken, a Scottish scientist, had said that a puff of tobacco smoke added to the atmosphere some 4000 million particles of dust. The lecturer asked his audience to think of that.

Passing on to the subject of cooking by gas, Mr. Grafton said the combustion of coal in an ordinary domestic closed coal-range was more wasteful than an open fire. About 82 per cent. of the heat was lost by way of the chimney; whereas that lost from the burning of gas did not exceed 15 per cent. if the cooker had been properly managed. The best cookers were those which retained the greatest amount of heat from any quantity of gas consumed in them. He showed what could be done with Glasgow gas in the way of cooking, and dwelt upon the

A User Who Says Of The "Thermo" What We Predicted Of It!

THE MANCHESTER & LIVERPOOL DISTRICT BANKING COMPANY, LTD.,
PRESTON.

1st February, 1910.

Dear Sir,

We have had for many years several Gas Fires in the House and Bank, and our experience of them has brought us nothing but disappointment; the new fire, however, is a revelation to us, and is doing everything that you promised on its behalf—it warms the room quickly and efficiently, is easily regulated, and, above all, does not dry up the atmosphere.

The old unpleasant odour of "Gas Fire," which we objected to so much has now entirely disappeared.

Yours faithfully,
(Signed) W. R. EASTERBY,
Sub-Manager.

Samuel Tagg, Esq.,
Engineer and Manager,
Preston Gas Company.

The Gas Fire which has proved such "A Revelation" is—

The "MASCOT."

The following Fires are fitted with the Patent "Thermo" Firefront:—The Patent "N.V."—"Salon"—"Stadium"—"Wizard"—"Mascot"—"Druid"—"Hotspur" and "Forum."

JOHN WRIGHT & CO., Essex Works, BIRMINGHAM.

advantages of the gas-cooker over the coal-range as a labour saver and also as a preventer of the pollution of the air.

As to gas-fires, the lecturer said that to be successful they should at least take the place of the present coal-fire in respect of the area of grate front. It was useless to fit into a room a gas-fire having 8 inches width of fire, and expect it to replace efficiently an 18-inch coal-fire. Equal scope should be given to the "smokeless one." Mr. Grafton pointed out that the great feature of the self-contained gas-fire is its portability. He said it could be taken from room to room, if needed, provided the gas supply was there, and could be easily connected by the householder, so that one fire would do for several rooms.

Passing next to the subject of the heating of water, the lecturer said the kettle method was the most important; and to illustrate this he exhibited a quick-boiling kettle. Since hot water is considered a luxury for such purposes as baths, &c., he instanced the geyser as a more economical method of heating water than the ordinary boiler fixed behind the kitchen range, as it could be used at all times. He said he believed in the type of geyser which heated the water on the principle of "no water, no gas."

In conclusion, Mr. Grafton said his advice was: "Have gas, use it well, and it will use you well."

As bearing upon the lecture, all the latest domestic gas appliances—including fire-lighters, rapid toasters, curling-tongs, washhouse boiler, and drying-press—were exhibited in the hall.

NOTES FROM SCOTLAND.

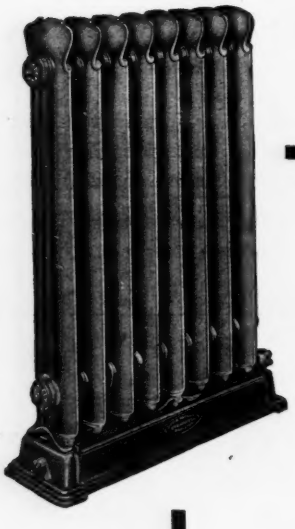
From Our Own Correspondent.

Saturday.

The visit of the Western District of the Scottish Junior Gas Association to the Broxburn Oil-Works this afternoon was greatly interfered with by the weather, which was of a very boisterous description. All the same, the visit was a most instructive one. Apart from the working of vertical retorts, which is carried on to perfection in shale oil-works, the persistence with which all the products are worked up is a lesson to gas engineers. At every point of a long-continued process of refinement, when the product which is desired has been obtained, the remaining residue is sent back for treatment again, in the hope that it may yield still more of the same or of some other product; and when such a product as permanent gas comes off, or when, at last, the resultant liquid is tar, from which no more oil is to be obtained, it is harnessed to heating duty, and is thus made to contribute to the economy of the works.

On the completion of new plant in the Alloa Corporation Gas-Works, the time was considered opportune for an official visit of inspection, and more particularly so because there had not been such a visit for four years. The inspection took place on Tuesday afternoon. Although it was the new plant which was to be inspected, the councillors were first shown the working of the coal breaker and elevator, and the De Brouwer charging-machine. Then they had the new Telpher railway, 40 feet above ground, explained to them, as well as the arrangement for elevating the hot coke to the railway, and its being quenched on its way to the yard, by being dipped into a water-tank on the roof of the engine-house. It was also shown that the coke could be discharged from the skips into the yard, or into hoppers of 30 tons capacity, to which screening plant is attached, as well as a bagging-machine. The beautiful lavatory for the workmen which has been fitted up was also looked at, as well as several other changes which have been made. Then tea was served in the office of the Engineer and Manager—Mr. J. W. Napier. Provost Duncanson having briefly extended a welcome to the Council, Bailie Pearson, the Convener of the Gas Committee, said that Mr. Napier had put into their hands a statement in which he gave very clear and exhaustive details in regard to the equipment of the works generally and of the improvements which might be required in the near future. The new railway would cost about £1600; but he was sure that, from the demonstration they had witnessed, they would be satisfied that this latest addition to the works would be of very great assistance in carrying on the work in connection with the coke department, and would also save a considerable amount in wages. They had also seen what the coal-charging machine could do; and he thought they would be satisfied Mr. Napier's anticipations had been fully realized, and his recommendation to purchase the machine been more than justified. In his statement, Mr. Napier referred to one or two improvements which would require to be faced in the near future. The first was the enlargement of the sulphate-house; the second was the extension of the retort-house. This would be a more important and a more costly improvement than the other. They had the ground, however, and the enlargement might be got over without much difficulty. Although not so urgent nor so pressing as the two improvements he had alluded to, the question of increased holder accommodation would soon require to be considered. At present they were in the somewhat fortunate position that the demand for gas during the day was as great as during the night. But this might not always continue; and they would therefore require to consider soon the question of additional holder accommodation. Another question the Council would require not to lose sight of was the getting of a railway siding into the works. Reference was made to the step which the Corporation are taking, of paying £3000 to enable them to break an agreement with the British Electric Plant Company, and to work the Electricity Department themselves. Bailie Pearson stated his opinion to be that it would be much more economical to supply electric current from the gas-works than from the present sub-station. A great deal might be said in favour of having a joint gas and electricity department; and with a capable man like Mr. Napier as Manager, there should be no difficulty in making the new department a success. Ex-Bailie Duff proposed a vote of thanks to Mr. Napier for the excellent arrangements he had made for the afternoon's inspection; and Mr. Napier appropriately returned thanks.

The shareholders of the Kirkcaldy Gaslight Company, Limited, met in the Town Hall, Kirkcaldy, yesterday, to consider the notice to treat



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UNIFORM HEAT DISTRIBUTION is secured without Steam and Water—and their attendant drawbacks.

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THE SMALLEST BATHROOM AND THE LARGEST SKATING RINK.

THE DAVIS GAS STOVE CO., LTD.,
LUTON.

which had been received from the Corporation. Mr. G. Davidson, the Chairman of the Directors, presided, and moved two resolutions—the first to the effect that the Company consented to sell to the Corporation; and the second giving authority to the Directors, in the event of arbitration being resorted to, to appoint an arbiter and follow out the arbitration as they might consider necessary in the interests of the Company. The motion was seconded by Mr. Adam Macpherson, late Manager of the Company. Mr. T. Johnston, Solicitor, moved the rejection of the second resolution. He complained of the way in which the business was being rushed, and criticized statements issued by Mr. W. L. Macindoe, who is both Town Clerk and Secretary to the Gas Company. Mr. Macindoe's statements, it was contended, were contradictory. The Chairman's motion was carried by a large majority, and the meeting was declared to be ended, when Mr. Macindoe said he wished to point out how immensely successful the Company had been since he became Secretary. Possibly when the figures were examined by the accountants employed by the town, the Directors might find that the property of the Company was larger than appeared from a casual examination of the accounts. He had been trusted by the Directors and by the Company for sixteen years; and he believed that the Company had prospered very much during that period. He explained to the shareholders at their last meeting that he was the largest shareholder of the Company. His clients also were large shareholders; and he would suggest to the meeting whether it was likely that he was going to do any injustice to himself and his clients and the Company. He had no doubt the bulk of the shareholders were quite satisfied that no injustice was going to be done them. It had been said that it was impossible for him to assist both parties in coming to a fair and reasonable arrangement. He saw no difficulty in the matter whatever; and he was confident that it was only under his guidance that a fair and reasonable arrangement would ever be arrived at between the parties. His ambition was to lead both parties to arrive at a fair price.

The lectures which are being delivered in Glasgow at present, in the cause of air purification, were continued during this week. Mr. Alex. Wilson, the Gas Engineer to the Corporation, spoke on "Smoke-Producing *versus* Smokeless Fuel," in Langside Hall on Tuesday evening; Mr. Walter Grafton, the Assistant Gas Manager, on "Domestic Uses of Gas," in Springburn Hall, on Wednesday evening;* Mr. A. Smith, the Manager of the Tradeston Gas-Works, on "Coal Gas and Some of Its Uses," in Dixon Hall, Govanhill, on Thursday evening; and Mr. S. B. Langlands, Inspector of Lighting, on "The Utility of Coal Gas for Cooking and Heating," in the Kingston Hall last night. The lectures have been very well attended.

The Kirkintillock Town Council, who two years ago erected new gas-works, at a cost of £40,000, are now faced with the question of acquiring the mineral rights in the ground upon which the works are built. The Council obtained a report from a firm of civil engineers, as a result of which the Gas Committee on Monday reported that they had agreed to ask the Woodilee Coal and Coke Company to indicate the price they wanted for each seam of coal under the gas-works.

* This lecture is noticed in another column.—ED. J.G.L.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 19.

Sulphate of Ammonia.

The market opened on Monday at an advance of 2s. 6d. per ton on last week's closing prices, and it has continued to gain strength day by day; so that the values now are £11 18s. 9d. per ton f.o.b. Hull, £12 per ton f.o.b. Liverpool, and £12 2s. 6d. per ton f.o.b. Leith. The rapid rise has been mainly caused by the anxiety of dealers to cover their February requirements, but new direct orders from abroad have also helped to bring about the present position. Home consumption is still on a small scale, agricultural operations having no doubt been delayed this year. Some transactions are reported to have taken place for July-December delivery at £11 10s. to £11 12s. 6d. per ton f.o.b. at best ports; but makers have advanced quotations for this period to £11 15s. per ton, and buyers decline to go on at the higher figure.

Nitrate of Soda.

This article is rather quiet, but holders refuse to accept less than 9s. 3d. per cwt. for 95 per cent. quality, and 9s. 6d. for refined.

LONDON, *Feb.* 21.

Tar Products.

The markets for tar products remained steady throughout the past week. Pitch still maintains its price; but not quite so many sales have been reported. Creosote continues fairly firm and in fair demand, both in London and the country. In benzol, all qualities are in pretty good demand. Solvent naphtha is quiet. Crude carbolic acid is unsettled; and in some quarters makers will not offer even 1s. 1d. per gallon.

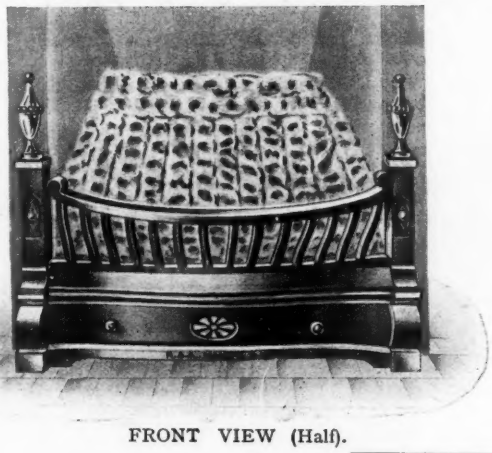
The average values during the week were: Tar, 15s. 6d. to 19s. 6d. *ex* works. Pitch, London, 31s. 6d.; east coast, 31s. to 31s. 6d.; west coast, 30s. to 31s. f.a.s. Mersey ports, 30s. f.o.b. others. Benzol, 90 per cent., casks included, London, 7¼d.; North, 6¾d.; 50-90 per cent., casks included, London, 7¾d. to 8d.; North, 7½d. to 7¾d. Toluol, casks included, London, 10d.; North, 9½d. Crude naphtha, in bulk, London, 4d. to 4¼d.; North, 4d. to 4¼d.; solvent naphtha, casks included, London, 1s. 2d. to 1s. 3d.; North, 1s. 1½d. to 1s. 2½d.; heavy naphtha, casks included, London, 11½d. to 1s.; North, 10½d. to 11½d. Creosote, in bulk, London, 2⅞d. to 2¾d.; North, 2½d. to 2¼d. Heavy oils, in bulk, 2¼d. Carbolic acid, 60 per cent., casks included, 1s. 0½d. to 1s. 1d. Refined naphthalene, £4 10s. to £8 10s.; salts, 45s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has somewhat improved during the past week, and there has been an improvement in buying; the tender parcels fetching exceedingly good figures. To-day the principal London Gas Companies quote £11 18s. 9d. to £12; and ordinary makes upon Beckton terms are £11 10s. to £11 12s. 6d. In Hull, £11 15s. is asked; and in Liverpool, £11 17s. 6d. In Leith, £12 is quoted; and in Middlesbrough, £11 17s. 6d.

THE "ST. NICHOLAS" GRATE FIRE

Is being put on Hire by many Gas Companies.



FRONT VIEW (Half).

WHY?

BECAUSE—

It's Attractive.

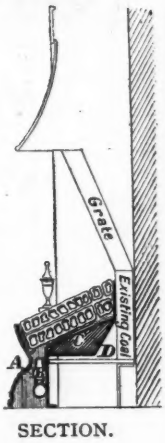
It's Economical.

With Black Fuel it looks like a Coal Fire.

Fits any Grate.

Gas Flame does not come in contact with Ironwork.

Therefore maintenance is practically Nil.



SECTION.

PUT ONE IN YOUR SHOW-ROOMS, LEAVE THE REST TO THE CONSUMER.

R. & A. MAIN, LTD.,

GOTHIC WORKS, ANGEL ROAD, EDMONTON, LONDON, N.,
GOTHIC IRON WORKS, FALKIRK, N.B.

Can be seen in Action at our Offices,

49, QUEEN VICTORIA STREET, E.C., & 136, RENFIELD STREET, GLASGOW.

COAL TRADE REPORTS.

Northern Coal Trade.

There is still some irregularity in the working of the Northern coal trade; but the output is now nearer normal, and prices for some qualities show ease. In the steam coal trade, the demand is moderate, as is usual at this season; so that the idleness of one or two collieries will have little effect should work continue at the rest. Best Northumbrian steam coals are about 10s. 9d. per ton f.o.b., second-class steams are 10s., and steam smalls from 5s. 6d. to 6s. 6d.—the latter being now in fuller output. In gas coals, the production is fair; and contracts are being better met than they were. Durham gas coals of the usual classes vary in price, according to quality, from 10s. 6d. to 11s. per ton f.o.b.; while for "Wear specials," something like 11s. 6d. to 11s. 9d. is the current quotation. Now that the deliveries on contracts are being overtaken, there is a little more likelihood of forward sales of coal being made; but the high freights to some of the Mediterranean ports make the quotations relatively high, though a few weeks may bring steamers back into their wonted trades. One or two small contracts for coal for the Baltic districts are under negotiation. Coke is firm. Gas coke is quoted 13s. 6d. to 13s. 9d. per ton f.o.b. the Tyne; and, as far as is known, supplies are not heavy at present.

Scotch Coal Trade.

There is little change to report. Outputs are moving off fairly well, at former figures. For shipment, there is an easier feeling in prices. Small stuffs are in demand, owing largely to the activity in the iron and steel trades. The prices now quoted are: Ell, 10s. to 10s. 6d. per ton f.o.b. Glasgow; splint, 10s. 9d. to 11s.; and steam, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 309,375 tons—an increase of 5621 tons upon the preceding week; and of 53,479 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,631,780 tons—an increase of 301,602 tons upon the corresponding period.

Reductions in Price.—The Scarborough Gas Company have decided to reduce the price of gas to ordinary consumers in the town by 2d. per 1000 cubic feet, and to those in Newby and Scalby by 3d. per 1000 cubic feet, after the end of the present quarter. The Directors of the Wisbech Lighting Company announce a reduction, as from the beginning of the year, of 2d. per 1000 cubic feet in the price of gas; making the net price 2s. 10d. for lighting, and 2s. 7d. for motive power.

Gas Profits at Walsall.—In presenting to the Walsall Town Council the annual report from the Gas Committee, showing a net profit of £8430, against £7476 for the previous year, Mr. Millerchip said the recent capital outlay on the gas-works was fully justified by the increased profit. Mr. Venables, in seconding, remarked that the profits from the undertaking during the last eight years had amounted to about £50,000, out of which the rates had benefited to the extent of some £35,000. The report was approved.

Water Supply of Beverley.—Mr. P. M. Crosthwaite last Thursday held an inquiry on behalf of the Local Government Board at Beverley into an application by the Corporation for power to borrow £1350 for the purchase of a new site for the water-works. The Town Clerk (Mr. J. W. Mills) stated that the site originally selected was found to be unsuitable; and as the result of expert advice, the Corporation decided to purchase a field on the Hull Bridge Road. It was for this that the loan was required. Mr. Baldwin Latham and Professor Kendall (of Leeds University) gave evidence as to the site being a favourable one.

Shrewsbury and the Standard Burner Bill.—At the quarterly meeting of the Shrewsbury Town Council on Monday of last week, Alderman Peele proposed that a petition be presented in opposition to the Gas Companies (Standard Burner) Bill, by which, he said, the Shrewsbury Gas Company, among others, were seeking to substitute a new burner for the one now in use for the official testing of the illuminating power of the gas supplied by them. The Committee had been advised that the effect of the proposal would be to reduce the quality of the gas; and they had in consequence sought to obtain from the Gas Company a promise to reduce the price. They had, however, received a reply that the Company were not prepared to give such an undertaking at present, as they did not anticipate any great financial advantage from the use of the new standard burner. Alderman Peele remarked that he did not think it was likely the gas companies would go to the expense and trouble of promoting a Bill in Parliament unless they had good grounds for expecting to derive considerable advantage. It was resolved to join with other local authorities in offering opposition to the Bill.

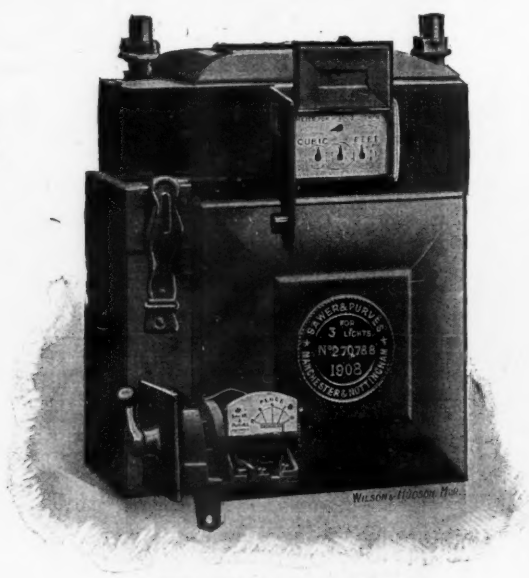
Newport (Mon.) Gas-Works Benefit Society.—There was a large attendance at the thirty-fourth annual dinner of the Society, which was held on Monday last week at the King's Head Hotel, Newport, under the presidency of Alderman Thomas Canning, the Engineer and Manager of the Newport Gas Company. Responding to the toast of "The Chairman and Directors of the Company," he said at present there were some thousands of pounds put aside by the members of the Society, many of whom were shareholders in the Company. He was a very strong believer in the policy of workmen becoming shareholders in the concern in which they were employed. The working man contributed very much to the revenue. His labour was to a certain extent capital; and capital and labour had to work together. This was so in actual fact to some extent in connection with their Company; and he hoped the day would come when it would be the rule in all works. He believed it was the intention of the Board to establish the system on a broader basis than it was at present. "Success to the Newport (Mon.) Gas-Works Benefit Society" was proposed by Alderman Greenland, and responded to by Mr. J. Whitefield and Mr. T. Donovan, who associated themselves with remarks which had been made during the evening with reference to the loss sustained by the Company by the death of the late Chairman (Mr. Richard Laybourne). Mr. Donovan also proposed the healths of Alderman Canning and Mr. T. H. Hazell (the Secretary of the Company), who responded.

THE

POSITIVE PREPAYMENT METER

WET AND DRY.

ANY SIZE FOR ANY COIN.



(With attachment detached.)

SAWER AND PURVES,

MILES PLATTING, MANCHESTER.

Scotch Representative: JNO. D. GIBSON, 2, Causeyside St., PAISLEY.

RADFORD ROAD, NOTTINGHAM.

Water Scheme for Penrith Western District.—At the meeting of the Penrith Rural District Council last Tuesday, a scheme for the construction of two reservoirs in Greystoke Park, for the common benefit of a number of parishes in the western district of Penrith, was sanctioned; and it was decided to apply to the Local Government Board to authorize a loan to carry it out, at an estimated cost of £19,000.

Failure of the Electric Light at Bristol.—The sudden failure of the Bristol Corporation's electric lighting threw the central portion of the city into darkness last Friday night from seven to eight o'clock. Great inconvenience resulted in places of amusement; but performances were given—long disused gas appliances being brought into requisition, and audiences sitting in semi-darkness. Shops, clubs, hotels, the Post Office, and other places had to fall back on gas-brackets or on candles.

Axbridge District Water Supply.—Owing to difficulties experienced in providing water for certain parts of their district, the Axbridge Rural District Council requested the Local Government Board to hold an inquiry into the matter; and it was decided that the sanitary circumstances of the district generally should be investigated by one of the Board's Medical Inspectors. The duty was assigned to Dr. Reginald Farrar, who recommends the carrying out of a comprehensive scheme of water supply, estimated to cost about £30,000. The population of the district is 5799, and the assessable value £37,417.

Helping the Electric Light at Hastings.—The following is from an article in a local paper on the estimates for the coming year, which have just been presented by the Hastings Borough Accountant to the Finance Committee of the Corporation: "The electric light undertaking has passed through a troublous year again. Very early it met with difficulties when the Gas Company opposed the making of the new rate for the conversion of the gas-lamps to electric light. This led to a change which necessitated what a member of the Council said could only be described as 'faking' the electricity accounts. In reality, the Electricity Committee are anticipating a larger income for the future, owing to the increase which was made in the price of current earlier in the year; but a deficit of £2000 has to be met—the estimated expenditure of £1625 for the previous year having, in actuality, doubled. Provision is therefore being made in the ensuing year for an expenditure of £4098, which necessitates £2000 being taken from the rates to give the undertaking a helping hand."

We are informed that Mr. S. Meunier, Engineer and Manager of the Stockport Corporation Gas-Works, has appointed Messrs. Robert Dempster and Sons, Limited, of Elland, Sole Agents for his patent No. 23,263, of 1908, which was recently described in the "JOURNAL" (*ante*, pp. 29 and 30). By the use of this arrangement, Mr. Meunier has obtained an increased make of 1223 cubic feet of gas per ton of coal, or 15 per cent., during his last financial year, as compared with the previous year, and without any trace of naphthalene on the district—the working conditions being the same.

APPLICATIONS FOR LETTERS PATENT.

2822.—JONES, H., "Incandescent burners." Feb. 4.
2832.—WELCH, W. H. I., "Reflectors for gas-lamps." Feb. 4.
2881.—HESKETT, T. J., "Gas-producers." Feb. 5.
2887.—REULEAUX, J., "Gas-producers." Feb. 5.
3136.—VALENTINE, G., "Cheapening the production of illuminating and heating gas." Feb. 9.
3146.—COUSINS, V. S., and FIELD, W. J., "Gas-economizers." Feb. 9.
3154.—BROWN, H. W., "Temporarily closing burst pipes." Feb. 9.
3177.—DAVEY, A. E., "Ladders for spiral-guided gasholders." Feb. 9.
3203.—STILL, W. M., & SONS, LTD., and ADAMSON, A. G., "Lighting gas-lamps." Feb. 9.
3241.—RICHMOND GAS STOVE AND METER CO., LTD., and RANSOME, J. A., "Gas-cooker plate-racks." Feb. 10.
3255.—HARRISON, C. W., "Automatically controlling the supply of gas to burners." Feb. 10.
3258.—GROCOCK, E., "Supporting gas shades and reflectors." Feb. 10.
3260.—ELLIS, R. B. A., "Gasalier." Feb. 10.
3279.—EATON, E., "Treatment of tar." Feb. 10.
3289.—NICHOLLS, J. F., and FLETCHER, E. J., "Incandescent burners." Feb. 10.
3298.—STILL, W. M., & SONS, LTD., and STILL, E. H., "Incandescent gas-lamps." Feb. 10.
3304.—IONIDES, A. C., jun., "Carburetted air." Feb. 10.
3352.—LOWE, A., "Producer gas plants." Feb. 11.
3377.—YATES, H. J., "Gas-fires." Feb. 11.
3485.—KESSLER, M. C., "Gas-engines." Feb. 12.
3490.—HANSFORD, J., and WRIGHT, A. C., "Gas-meters." Feb. 12.
3491.—HANSFORD, J., and WRIGHT, A. C., "Diaphragm attachments for gas-meters." Feb. 12.
3492.—HANSFORD, J., and WRIGHT, A. C., "Prepayment meters." Feb. 12.
3493.—HANSFORD, J., and WRIGHT, A. C., "Water-meters." Feb. 12.
3517.—TEITGÉ, G., "Production of air-gas." Feb. 12.

Messrs. Hathorn, Davey, and Co., Limited, of Leeds, have sent a pamphlet they have just brought out containing illustrations and descriptions of their water or sewage pumping machinery, the manufacture of which has been specialized by them for the past sixty years. The pamphlet gives some typical examples of work which has been carried out; and they embody standard designs which have been developed after long experience. One of the illustrations is of the horizontal high-duty triple-expansion engine at the Widnes Water-Works; and it is accompanied by some observations by Mr. Isaac Carr, the Gas and Water Engineer to the Widnes Corporation, on the installation, and on the advantage of adopting boreholes instead of wells.

THE GAS COOKER OF TO-DAY.

THE

WILSON "ADVANCE."

THE "ADVANCE" is the only Cooker that combines **all** the essentials of an up-to-date Gas Stove.

THE "ADVANCE" is the **most approved Cooker** from a Practical and Scientific Standpoint.

THE "ADVANCE" will appeal to your best Consumer. It has

16 DISTINCT AND NOVEL DEVICES

which are all "Selling Points."

Be Progressive and order a Sample now from the Manufacturers.

WILSONS & MATHIESONS, LTD.,

Carlton Works, ARMLEY, LEEDS.

Prompt measures on the part of the officials of the school and the Hanwell Fire Brigade prevented serious consequences resulting from a slight fire which occurred last Friday night at the Central London Schools, Hanwell, where nearly 900 children sleep on the premises. The gas-meter house was found to be on fire, as the result of a leak at the meter, and determined steps were at once taken to extinguish the flames.

The Little Hulton Urban District Council have decided to take a poll of the ratepayers on the question of whether their Bill shall be proceeded with. The Bill is to authorize the acquisition from the Salford Corporation by the Council of the Corporation's gas-mains in the district, and the entering into of an agreement with the Earl of Ellesmere to buy gas manufactured at the Brackley Coke-Ovens, Little Hulton. A meeting of the ratepayers has already decided against the Bill.

Owing to a curtain coming into contact with a gas-jet in the maids' quarters at the Parkhill Fever Hospital of the Liverpool Corporation early last Saturday morning, the building, which was composed mainly of wood, was destroyed, as were also the officers' quarters. A fire, caused by a swinging gas-bracket, resulted in a destructive outbreak of fire at 10, Huntley Street, W.C. (a large house of ten rooms), last Saturday night. There were five families resident in the building.

Mainly as a result of overtures made by the Ashford Chamber of Commerce, arrangements have been made for an interchange of commercial lectures between the Canterbury and Ashford Chambers. Last Wednesday evening, Mr. R. A. Turner, the Engineer and Manager of the Ashford Gas Company, gave an interesting illustrated lecture to the members of the Canterbury Chamber on "Gas, from Coal to the Consumer." At the close of the lecture questions were invited; and Mr. Turner was accorded a hearty vote of thanks.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations, &c., Vacant.

REPRESENTATIVE (OXIDE). No. 5180.
SOLE AGENCY (ANTI-CORROSIVE WATERPROOF PAINT). No 5184.
TRAVELLER. No. 5191.
WORKING FOREMAN FITTER. Winchester Water and Gas Company.
CANVASSERS. No. 5188.
FITTER. No. 5189.

Situations Wanted.

ASSISTANT-MANAGER OR HEAD FOREMAN (COKE-OVENS). No. 5187.
METER INSPECTOR. G. L., Aston Street, Birmingham.
REPRESENTATIVE (SOUTHERN COUNTIES). No. 5192.

Plant, &c. (Second Hand), for Disposal.

EXHAUSTERS AND STEAM ENGINES. Smethwick Gas Department.
GAS-WORKS (TWO) COMPLETE. No. 5185.
PURIFIERS, &c. Swansea Gas Works.

Plant (Second-Hand) Wanted.

TOWER SCRUBBER. No. 5190.

Processes for Disposal.

BURNING-OFF INVERTED MANTLES. Gesellschaft uer Verwertung Chemischer Produkte, Berlin.
INCANDESCENT MANTLES. Alb. Baumgarten, Barmen.

Stocks and Shares.

EAST HULL GAS COMPANY. March 1.
HORNSEY GAS COMPANY. March 22.
RIDDINGS DISTRICT GAS COMPANY. March 7.
ROMFORD GAS AND COKE COMPANY. March 15.
SOUTH ESSEX WATER COMPANY. March 1.
TOTTENHAM AND EDMONTON GAS COMPANY. March 1.
WANDSWORTH AND PUTNEY GAS COMPANY. March 15.

TENDERS FOR

Benzol.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Coal and Cannel.
MOUNTAIN ASH URBAN DISTRICT COUNCIL. Tenders by March 8.
SALFORD GAS DEPARTMENT. Tenders by March 10.

Compressing Plant (High-Pressure Distribution).
DUNDEE GAS COMMISSIONERS. Tenders by Feb. 28.

Condensers.
STOURBRIDGE GAS DEPARTMENT. Tenders by March 8.

Cookers.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Fire-Clay Goods.
BOLLINGTON GAS DEPARTMENT. Tenders by March 9.
BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.
ROCHDALE GAS DEPARTMENT. Tenders by March 2.

General Stores (Brass Fittings, Lead and Compo. Pipe, Barrows, Paints, Brushes, Oils, Tallow, Stoneware Pipes, Cement and Sand, Timber, Steel and Iron, Bolts and Nuts, Tools, Main Taps, Ironmongery, &c., &c.).
BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
DEVONPORT GAS DEPARTMENT. Tenders by March 5.
MOUNTAIN ASH URBAN DISTRICT COUNCIL. Tenders by March 8.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Incandescent Goods, Gas Fittings, Lanterns, &c.
DEVONPORT GAS DEPARTMENT. Tenders by March 5.
DUBLIN CORPORATION. Tenders by Feb. 23.
MOUNTAIN ASH URBAN DISTRICT COUNCIL. Tenders by March 8.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Meters.
BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
MOUNTAIN ASH URBAN DISTRICT COUNCIL. Tenders by March 8.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Oil.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 28.

Oxide of Iron (Spent).
ROCHDALE GAS DEPARTMENT. Tenders by March 2.

Pipes, &c.
BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
CLACTON URBAN DISTRICT COUNCIL. Tenders by March 2.
DEVONPORT GAS DEPARTMENT. Tenders by March 5.
DUNDEE GAS COMMISSIONERS. Tenders by Feb. 28.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 28.
MOUNTAIN ASH URBAN DISTRICT COUNCIL. Tenders by March 8.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.
RADCLIFFE AND PILKINGTON GAS COMPANY. Tenders by March 1.

Retorts, Resetting (See also Fire-Clay Goods), &c.
BOLLINGTON GAS DEPARTMENT. Tenders by March 9.
BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.

Sulphuric Acid.
BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 28.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Tar and Liquor.
BOLTON GAS DEPARTMENT. Tenders by Feb. 24 (see advertisement Feb. 15, p. 463).
EXETER GASLIGHT COMPANY. Tenders by March 7.
MOUNTAIN ASH URBAN DISTRICT COUNCIL. Tenders by March 8.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINHELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams:—
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OXIDE OF IRON (BOG ORE).
ANY QUANTITY. ANY PORT. ANY STATION.
DONALD M'INTOSH,
110, CANNON STREET, LONDON.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
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SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

BENZOL
AND
CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

W. EDGAR for:—
GAS HEATING APPARATUS—
THE BLENHEIM FIRE, &c.
BLENHEIM WORKS, HAMMERSMITH.
Telegrams: "GASOSO LONDON." Telephone: 14 HAMMERSMITH.

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

LUX'S GAS PURIFYING MASS.
See Advertisement on p. 534.
FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

KRAMERS AND AARTS WATER-GAS PLANT.
K. & A. WATER-GAS COMPANY, LTD.
89, VICTORIA STREET, S.W.

SULPHURIC ACID.
SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

METER INDICES
WITH AND WITHOUT DIALS.
A. ROUX & CO., Limited,
9, SOUTHAMPTON STREET, HOLBORN, W.C.
MOVEMENTS FOR CLOCKS, PHOTOMETERS AND BAROGRAPHS, WHEELS, PINIONS, AND WORMS.
WORKS, HANDSWORTH, BIRMINGHAM.

ROBERT B. FITZMAURICE,
4, EAST INDIA AVENUE,
LEADENHALL STREET, LONDON.
Telegraphic Address: "FITZMAURICE, LONDON." Telephone: No. 11,113 CENTRAL.
Established 1887.
Advertiser, who is Shipping Agent to several Gas Companies, Municipalities, and Gas Material Makers, would be glad to undertake SHIPMENT OF GOODS ordered by Colonial Gas-Works or Others.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0648.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 28, COLLEGE HILL, LONDON, E.C., and 25, BRIDGE END, LEEDS.

AMMONIA.
Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

J. E. C. LORD, Ship Canal Tar Works,
Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

TAR WANTED.
Telephone: Central Manchester, 7002.
Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS,
Albert Chemical Works, BRADFORD, MANCHESTER.
Pitch. Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

SPENCER'S PATENT HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Feb. 1, p. 277.

OXIDE OF IRON FOR GAS PURIFICATION.
Please Address Inquiries for Analysis and Prices to the
NEW WESTBURY IRON COMPANY, LTD.
WESTBURY, WILTS.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger.
The one Machine which Discharges and Charges at One Stroke.
See Advertisement, Feb. 8, p. III. of Centre.
ALDRIDGE AND RANKEN,
89, VICTORIA STREET, WESTMINSTER, S.W.
Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

"V.S.C." PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

GEO. NEWTON, Limited,
Wires: "AUTOMATIC, MANCHESTER."
40 YEARS' REPUTATION.
WET, DRY, ORDINARY and PREPAYMENT, STATION METERS, &c.
Late of Oldham—Note *new* Address:—
39, RIVER STREET, HULME, MANCHESTER.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.
RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING.
UNDERWOOD HOUSE, PAISLEY.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

APPLICATIONS FOR APPOINTMENTS.
DO you appreciate how much success depends on well-considered and lucid presentment of your qualifications? I make a Specialty of the Preparation of Applications, and am continually receiving complimentary letters from clients. Write now for Particulars.
HERBERT GREATOREX, HACKNEY, MATLOCK.

WANTED, a Situation by Meter Inspector. Practical Gas Fitter; Meters, Cookers, Gas-Fires, &c., and Maintenance.
Address G. L., 96, ASTON STREET, BIRMINGHAM.

ADVERTISER, well-known in the Southern Counties, wishes to REPRESENT two or three Firms. Will call personally on Gas, Water, Electricity and other Works. Terms to be arranged at interwiew.
Address No. 5192, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BYE-PRODUCT COKE-OVENS.
WORKING Manager is desirous of a SITUATION. Would accept place as ASSISTANT-MANAGER or HEAD FOREMAN. Good References.
Address No. 5187, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXPERIENCED Fitter required, accus- tomed to Acetylene and Lacquering.
Apply, by letter, to No. 5189, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-STOVE TRADE.
THOROUGHLY Experienced and Re- liable Men required for Canvassing for Gas Stoves.
Apply, by letter, stating Age, Experience, and Full Qualifications, to No. 5188, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, by the Winchester Water and Gas Company, a capable WORKING FOREMAN FITTER. Cyclist. Wages, 32s. 6d per week.
Applications to the General Manager, Staple Garden, WINCHESTER.

TRAVELLER wanted by Firm of Gas and General Engineers in the North of England. One Conversant with Carbonizing and General Conveying and Screening Plants, Steel Structure Work, &c.
All Applications will be treated in confidence.
Apply, by letter, stating full Particulars of Experience, Salary required, &c., to No. 5191, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SOLE Agency to be given away, on Merchant Terms, of a Reliable ANTI-CORROSIVE WATERPROOF PAINT for Iron and Cement Surfaces, for the United Kingdom and some of the Crown Colonies. The Paint could be partly Manufactured in England. First-Class Testimonials.
Address Applications, with Trade and Banker's References, to No. 5184, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A WELL-KNOWN Continental Firm, Established in 1885, wants a First-Class British Firm of Gas Engineers to REPRESENT them in the United Kingdom for the Sale of their High-Class OXIDE OF IRON for GAS PURIFICATION.
Address No. 5180, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SCRUBBER.
WANTED by a Gas Company making 13 Millions, a suitable Second-Hand TOWER SCRUBBER. Must be Cheap and in Fair Condition.
Particulars to No. 5190, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

JAPAN-BRITISH EXHIBITION.
A FIRM Exhibiting a Bungalow at above is desirous of Co-operating with Firms for Lighting, Heating, and Furnishing.
Apply, with Offers, to BOX No. 1474, JUDDS, 5, QUEEN VICTORIA STREET, E.C.

TO BE SOLD, a Valuable Invention for the MANUFACTURE of WOVEN INCANDESCENT MANTLES, the Patents of which have been Applied for.

For Particulars, please address 48,172 care of ALB. BAUMGARTEN, Advertising Agent, Barmen, GERMANY.

PURIFIERS.

THE Swansea Gaslight Company have for Immediate Sale—Four 20 feet Square by 5 feet deep PURIFIERS, with 24-inch Lutes, 18-inch Connections, and Centre Valve Complete. Immediate Removal.

Apply to the MANAGER, Gas-Works, SWANSEA.

CAST-IRON Pipes. Spigot and Socket or Flanged. Special Quality—9 feet or 12 feet Lengths. When buying, Write us.

A. LOWCOCK, Limited, SHREWSBURY.

GASHOLDERS—Splendid 45 feet diameter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.

FIRTH BLAKELEYS, Thornhill, DEWSBURY.

TO BE SOLD, a process for Burning InVERTED MANTLES on the Actual Burner, which consists in making apertures in one or several places in the wall of the fabric of the Mantle, the width of the said apertures being at least twice that of the meshes of the Mantle, while in the interior of the Mantle above the aperture an impregnated piece of fabric may be fitted like a flap valve, which automatically closes the aperture after igniting the flame.

For further Particulars, Apply to the GESELLSCHAFT FUER VERWERTUNG CHEMISCHER PRODUKTE, BERLIN, S.W. EICHHORNSTR., 11.

COUNTY BOROUGH OF SMETHWICK.

(GAS DEPARTMENT.)

SECOND-HAND EXHAUSTERS AND STEAM-ENGINE.

THE Gas Committee of the Corporation of Smethwick have FOR SALE—

Two Donkin EXHAUSTERS, with STEAM-ENGINES COMBINED, including Disc Valves. Nominal capacity, 40,000 and 60,000 Cubic Feet per Hour respectively; also a

HORIZONTAL HIGH-PRESSURE STEAM-ENGINE, 14-inch bore, 20-inch stroke, to work at 80 Steam Pressure.

The plant can be seen at work at the Gas-Works, Rabone Lane, during the next two or three weeks; and any further Particulars can be obtained on Application to Mr. Vincent Hughes, Engineer, at the Gas-Works.

Offers, endorsed "Second-Hand Plant," to be addressed to the Chairman of the Gas Committee, and sent to the undersigned.

W. J. STURGES,
Secretary.

Gas Department, Council House,
Smethwick, Feb. 15, 1910.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply of COAL and CANNEL required at their works during a period of One Year.

Forms of Tender may be obtained on Application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Coal," to be delivered to me not later than Three p.m., on Thursday, the 10th of March, 1910.

L. C. EVANS,
Town Clerk.

Town Hall, Salford,
Feb. 17, 1910.

BOLLINGTON URBAN DISTRICT COUNCIL.

GAS-WORKS.

THE Gas Committee of the above Council are prepared to receive TENDERS for the RECONSTRUCTION of TWO BENCHES of RETORTS and for the CONSTRUCTION of a SUBWAY.

Full Particulars may be obtained from Mr. William Rogerson, Gas Manager.

Sealed Tenders, endorsed "Retort Benches and Subway," to be forwarded so as to reach the undersigned not later than the 9th of March, 1910.

The Council do not bind themselves to accept the lowest or any Tender.

SAMUEL KNIGHT,
Clerk to the Council.

Council Offices, Bollington,
Feb. 19, 1910.

DUNDEE GAS COMMISSIONERS.

(DUNDEE CORPORATION.)

THE Dundee Gas Commissioners are prepared to receive TENDERS for:—

GAS COMPRESSING PLANT FOR HIGH-PRESSURE DISTRIBUTION,

SPIGOT AND FAUCET STEEL MAINS, 6-inch and 4-inch.

General Conditions, Specification, and Form of Tender may be obtained on Application to the Engineer, from whom all Particulars may be obtained.

Sealed endorsed Tenders to be lodged with Wm. H. Blyth Martin, Esq., Town Clerk, City Chambers, Dundee, not later than Monday, Feb. 28.

The Commissioners do not bind themselves to accept the lowest or any of the Tenders.

ALEXANDER YUILL,
Engineer and Manager.

Engineer's Office, Gas-Works,
Dundee, February, 1910.

BOROUGH OF ROCHDALE.

TO FIRE-BRICK MAKERS AND OTHERS.

THE Gas and Electricity Committee of the above Corporation invite TENDERS for the Supply of such quantities of RETORTS and other FIRE-CLAY MATERIALS as they may require for ordinary repairs during the Current Year.

Forms of Tender, and any other Information may be obtained on Application to Mr. T. Banbury Ball, the Manager, at the Gas-Works, Dane Street.

Tenders, endorsed "Retorts," and addressed to the Chairman of the Gas and Electricity Committee, must be sent in to me not later than noon on Wednesday, March 2, 1910.

By order,
WM. HENRY HICKSON,
Town Clerk.

Town Hall, Rochdale,
Feb. 17, 1910.

BOROUGH OF ROCHDALE.

TO VITRIOL MAKERS AND OTHERS.

THE Gas and Electricity Committee of the above Corporation invite TENDERS for the Purchase of about 500 Tons of SPENT OXIDE OF IRON, containing not less than 50 per cent. of Sulphur.

The Purchaser will be required to provide Railway Waggons or Boats for its Removal. The Corporation will deliver it free on Rails at Rochdale Station or into Boats at the Canal Wharf, Rochdale, as may be required; but the Tender must state which mode of conveyance is selected.

Samples of the Material and any further Information may be obtained on Application to Mr. T. Banbury Ball, the Manager, at the Gas-Works, Dane Street.

Tenders, stating Price per Unit of Sulphur per Ton, must be sent in to me, endorsed "Spent Oxide," and addressed to the Chairman of the Gas and Electricity Committee, not later than Noon on Wednesday, March 2, 1910.

By order,
WM. HENRY HICKSON,
Town Clerk.

Town Hall, Rochdale,
Feb. 16, 1910.

MOUNTAIN ASH URBAN DISTRICT COUNCIL.

TAR AND AMMONIACAL LIQUOR.

THE Council invite Tenders for the taking of the Surplus TAR and the whole of the AMMONIACAL LIQUOR produced at the Gas-Works for One Year from the 1st day of April, 1910.

Further Information required may be obtained from Mr. W. G. Thomas, Surveyor, Town Hall, Mountain Ash.

Sealed Tenders, prepaid and endorsed "Tar or Ammoniacal Liquor" (as the case may be), to be sent to me so that they may be received not later than Ten o'clock in the forenoon of Tuesday, the 8th day of March, 1910.

The Council do not bind themselves to accept the highest or any Tender.

By order,
H. P. LINTON,
Clerk to the Council.

Town Hall, Mountain Ash,
Feb. 15, 1910.

MOUNTAIN ASH URBAN DISTRICT COUNCIL.

TENDERS FOR STORES.

THE Mountain Ash Urban District Council invite TENDERS for the following named STORES for One Year from the 1st day of April, 1910:—(1) GLASS. (2) PAINTS and BRUSHES. (3) OILS. (4) STONEWARE PIPES and SPECIALS. (5) CAST-IRON PIPES and SPECIALS. (6) CEMENT and SAND. (7) TIMBER. (8) WROUGHT-IRON TUBES and FITTINGS. (9) GAS-FITTINGS. (10) GAS-METERS. (11) STREET LANTERNS. (12) CASTINGS. (13) IRONMONGERY. (14) HOUSE and STEAM COALS. (15) INCANDESCENT GAS MANTLES.

Forms of Tender, with Conditions and Specification, may be obtained on Application to Mr. W. G. Thomas, Surveyor, Town Hall, Mountain Ash.

Sealed Tenders, prepaid and endorsed with words denoting what item is tendered for, to be sent to me so that they may be received not later that Ten o'clock in the forenoon of Tuesday, the 8th day of March, 1910.

Contractors will be required to pay their workmen the recognized Trades Union Rates of Wages.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
H. P. LINTON,
Clerk to the Council.

Town Hall, Mountain Ash,
Feb. 15, 1910.

BOROUGH OF BRIGHOUSE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply of the following REQUIREMENTS during the Twelve Months ending the 31st of March, 1911.

1—GAS METERS, Wets and Drys.
2—IRONMONGERY, including Lead Pipe, Cotton Waste, Shovels, Iron, Steel, and Brushes.
3—WROUGHT-IRON TUBES and FITTINGS including Malleable Fittings.
4—OILS, PAINTS, &c.
5—SULPHURIC ACID.
6—RE-SETTING RETORTS, REGENERATORS, and FURNACES.

Form of Tender for each item, together with Specification and Particulars, may be obtained on Application to Mr. Harold Davies, Engineer and Manager, Gas-Works, Brighouse.

Sealed Tenders, duly endorsed, must be sent to the undersigned not later than Tuesday, the 1st of March, 1910.

HERBERT G. ROBERTS,
Acting Town Clerk.

Municipal Offices,
Brighouse, Feb. 15, 1910.

URBAN DISTRICT COUNCIL OF STOURBRIDGE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for WATER-COOLED CONDENSERS.

Specification and all Particulars on Application to the undersigned.

The lowest or any Tender not necessarily accepted.

Latest day for Tenders, March 8, 1910.

CHARLES H. WEBB,
Engineer and Manager.

Gas-Works, Stourbridge,
Feb. 19, 1910.

EXETER GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for such TAR as they may not desire to dispose of to persons others than Distillers, for Twelve Months from the 25th of March next, at per Ton of 20 cwt., delivered into Contractors' Tanks at the Company's Works.

Sealed Tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Monday, the 7th of March next; but the Directors do not bind themselves to accept the highest or any Tender.

By order,
WM. N. WESTLAKE,
Secretary and Manager.

Gaslight Offices, Exeter,
Feb. 18, 1910.

CLACTON URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive TENDERS for the Supply and Delivery of about 50 Tons of British CAST-IRON PIPES and CONNECTIONS.

Copy of Specification and Form of Tender may be obtained from the Council's Engineer, Mr. Sydney Francis, Assoc.M.Inst.M.E., Town Hall, Clacton-on-Sea.

Sealed Tenders, endorsed "Tender for Pipes," to be delivered to the undersigned not later than noon on Wednesday, the 2nd of March, 1910.

The Council do not bind themselves to accept the lowest or any Tender.

GEO. T. LEWIS,
Clerk to the Council.

Town Hall Buildings,
Clacton-on-Sea, Feb. 19, 1910.

THE Corporation of Middleton are prepared to receive TENDERS for the following ARTICLES and GOODS, SUNDRY STORES for the Gas-Works: VITRIOL, OIL, and TUBES and FITTINGS.

Further Particulars and Form of Tender, which will contain a Fair Wages Clause, may be obtained from Mr. C. F. Broadhead, Gas Engineer, Gas-Works, Middleton.

Tenders, addressed to the Chairman of the Gas Committee, endorsed "Tender for Sundry Stores," are to be delivered at my office not later than Feb. 28, 1910.

The Corporation do not bind themselves to accept the lowest or any Tender.

FREDERICK ENTWISTLE,
Town Clerk.

Town Hall, Middleton,
Feb. 18, 1910.

PONTYPRIDD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the Purchase of the Surplus COAL-GAS TAR and WATER-GAS TAR produced at their Treforest Works during the Year ending March 31, 1911.

Tenders to state the Price per Ton, or per 200 Gallons for (*a*) Coal-Gas Tar; (*b*) Water-Gas Tar.

The Tar will be delivered into the Contractor's Railway Tank Waggons at the Treforest Gas-Works Siding, Alexandra Docks and Railway Company's line.

Tenders, sealed and endorsed "Surplus Tar," must be received by the undersigned, on or before Monday, March 7, 1910.

J. COLENSO JONES,
Clerk to the Council.

Municipal Buildings,
Pontypridd, Feb. 19, 1910.

PONTYPRIDD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the Supply of the following STORES and MATERIALS for the year ending March 31, 1911:—

No. 1—Gas Cookers.
No. 2—Sulphuric Acid.
No. 5—Fire-Clay Goods, &c.
No. 5A—Silica Fire-Clay Goods.
No. 6—Wrought Iron Tubes and Fittings.
No. 7—Lead and Compo. Tubing.
No. 8—Barrows, Rake Heads, &c.
No. 9—Oils and Benzol.
No. 10—Brass Fittings and Sundries.
No. 11—Slot Fittings.
No. 12—Meters.
No. 13—Main Taps and Locks.
No. 15—Cast-Iron Mains and Specials.
No. 16—Incandescent Materials.
No. 18—Lamps and Copper.
No. 19—Horse Feed.

Forms of Tender and Specification may be obtained, on Application, from Mr. E. H. Swain, Engineer, Gas-Works, Treforest, Pontypridd.

Tenders, on the prescribed Forms, sealed and endorsed "Tenders for Gas-Stores, No. ——" (as the case may be), must be received by the undersigned on or before Monday, March 7, 1910.

The Council do not bind themselves to accept the lowest or any Tender.

J. COLENSO JONES,
Clerk to the Council.

Municipal Buildings,
Pontypridd, Feb. 19, 1910.

CITY OF DUBLIN.

THE Corporation of Dublin are prepared to receive TENDERS for the Supply of MANTLES and 6-inch JENA CHIMNEYS for Street Lighting for the ensuing Year to the 31st of March, 1911.

Samples of at least Six of each to be forwarded to the Town Clerk, City Hall, Dublin (the Tenders to be enclosed in a sealed envelope), marked "Tender for Incandescent Goods," and addressed to the Chairman of the Supplies Committee, City Hall, Dublin, and forwarded on or before the 23rd inst.

By order,
HENRY CAMPBELL,
Town Clerk.

Town Clerk's Office, City Hall,
Dublin, Feb. 14, 1910.

COUNTY BOROUGH OF DEVONPORT.
(GAS DEPARTMENT.)

TENDERS are invited for the Supply of:

1—WROUGHT-IRON TUBES and FITTINGS.
2—PAINTS, OILS, TALLOW, WASTE, &c.
3—STEEL and IRON, various sizes.
4—BOLTS and NUTS.
5—TOOLS, FITTERS' INDOOR and OUTDOOR REQUIREMENTS.
6—MANTLES, PROTECTORS, &c.
7—SUNDRIES.

Specification and Form of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for ———," and addressed to the Town Clerk, Municipal Offices, Devonport, must be delivered on or before Twelve o'clock noon on the 5th of March, 1910.

The Corporation do not bind themselves to accept the lowest or any Tender.

W. P. TERVET,
Engineer and Manager.

Gas-Works, Devonport,
Feb. 15, 1910.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

Alteration in date of Sale.

By order of the Directors of the
HORNSEY GAS COMPANY.

NEW ISSUE OF £5000 CONSOLIDATED STOCK,
£6500 FIVE PER CENT. PREFERENCE STOCK,
AND
£3000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 22, at Two o'clock precisely, in Lots, instead of Tuesday, March 1, as previously announced.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTH ESSEX WATER-WORKS COMPANY.

ISSUE OF £20,000 NEW CAPITAL, COMPRISING
£5000 FIVE PER CENT. MAXIMUM ORDINARY STOCK,
£10,000 FIVE PER CENT. PREFERENCE STOCK
AND
£5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 1, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £12,500 THREE PER CENT. DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ROMFORD GAS AND COKE COMPANY, LIMITED.

NEW ISSUE OF 600 £5 "B" AND £2000 FOUR PER CENT. DEBENTURE BONDS.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

RADCLIFFE AND PILKINGTON GAS COMPANY.

TENDERS FOR PIPES.

TENDERS are invited for the Supply of 6-inch CAST-IRON GAS MAINS, in 12 Feet Lengths.

Further Particulars may be obtained from the undersigned, by whom Tenders will be received until Tuesday, the 1st of March.

JAMES BRADDOCK,
Manager and Secretary.

Gas-Works, Radcliffe,
Feb. 16, 1910.

RIDDINGS DISTRICT GAS COMPANY.

SALE BY TENDER OF
400 FIVE PER CENT. PREFERENCE SHARES OF £10 EACH.

THE MINIMUM PRICE IS £10 PER £10 SHARE.

THE Shares will be registered Free of Expense to the Purchaser.

The last day for the reception of Tenders is Monday, the 7th of March, 1910.

Particulars and Conditions of Sale may be obtained at the Offices of the Company.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 6 and 7, Queen Street,
Cheapside, London, Feb. 1, 1910.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER, under the Authority of the Tottenham and Edmonton Gas Act, 1906
£30,000 "B" Consolidated Stock.
Minimum price, £111 per £100 Stock.

Tenders will be received up to Five o'clock p.m. on Tuesday, March 1, 1910.

The progressive character of the Company's Business will be seen from the following statement:—

Year ended Dec. 31.	Registered Consumers.	Price of Gas.	Dividend on "B" Stock.
			Per Cent.
1901	19,040	3s. 4d.	4
1902	22,505	3s. 0d.	4½
1903	27,070	3s. 0d.	4½
1904	32,072	2s. 10d.	4½
1905	37,363	2s. 10d.	4½
1906	41,733	2s. 8d.	5
1907	45,691	2s. 6d.	5½
1908	49,982	2s. 6d.	5½
1909	53,785	2s. 5d.	5¾

The full statutory Dividends have been paid for many years.

The price of Gas is now 2s. 4d. per 1000 Cubic Feet, and a Dividend of £5 10s. Per Cent. per Annum may therefore be paid.

Particulars of Sale, with Form of Tender attached, may be obtained at the Head Office of the LONDON AND PROVINCIAL BANK, LOTHBURY, E.C., or at any of their Branches, or will be forwarded on Application to me.

By order of the Directors,
E. TOPLEY,
Secretary.

Chief Offices of the Company,
High Road, Tottenham.
Feb. 4, 1910.

EAST HULL GAS COMPANY.

SALE BY TENDER OF £5000 NEW FIVE PER CENT. ORDINARY STOCK.

THE Directors Offer for Sale, by Tender, the above Amount of STOCK, to be issued under the Provisions of the East Hull Gas Act, 1906, and the various Acts incorporated therewith.

Since the year 1867, the Company has paid without intermission the Maximum Dividend allowed by Parliament.

The Dividend is Cumulative—*i.e.*, should the Profits of the Company in any one year be insufficient to pay the Maximum Dividend, the same may be made up out of the Reserve Fund or out of Surplus Profits in any future Year.

Any amount of Stock being a multiple of £5 but not less than £20 may be applied for.

The Stock will be allotted to the Highest Tenders.

A deposit of £10 per Cent. on the nominal amount of the Stock applied for must accompany each Tender, and the Allottees must pay the remainder of the Purchase Money on or before the 31st day of March, 1910.

LAST DAY FOR RECEIPT OF TENDERS, TUESDAY, the 1st DAY OF MARCH, 1910.

Forms of Tender and Particulars of Sale can be obtained at the Local Branches of Messrs. Barclay and Co., Limited, Bankers; or from the Offices of the Company.

By order of the Board of Directors,
DAVID WOOD,
Secretary.

Offices: Saint Mark Street,
Hull, Feb. 7, 1910.

Price 5s. 6d. Post Free.

REPORTS OF DISTRICT GAS ASSOCIATIONS FOR 1909.

London: WALTER KING, 11, Bolt Court, Fleet St., E.C.

Just Published. Demy 8vo. 168 pages. 109 Illustrations. 8s. 6d. net.

MODERN COKING PRACTICE,

Including the Analysis of Materials and Products.

A Handbook for those engaged in Coke Manufacture and the Recovery of Bye-Products.

By T. H. BYROM, F.I.C., F.C.S., Mem. Soc. Chem. Indus., Chief Chemist to the Wigan Coal and Iron Company, And J. E. CHRISTOPHER, Memb. Soc. Chem. Indus., Lecturer on Coke Manufacture at the Wigan Technical College.

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7, Stationers' Hall Court, E.C., & 121A, Victoria St., S.W.

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Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

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NEW EARTH BORERS.

15 Patents. Highest Awards.
Work easily and quickly. Reliable.

For Earth-Working, Boring, Soil-Testing, Planting, Sinking Fences, Posts, and various other uses.

Borers from 60 to 400 mm. (2⅜ in. to 16 in.) diameter.

Great Saving of Labour. Low Prices.

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E. JASMIN,
Kamburg 30. Lehmweg 30.

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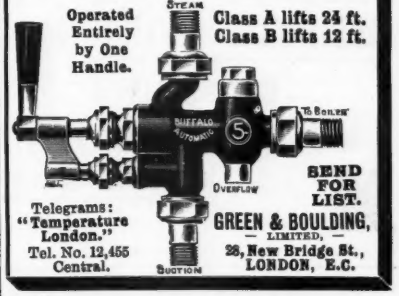

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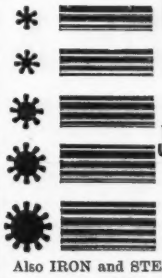

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any lengths.

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Also IRON and STEEL WIRE of all descriptions.

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from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

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BRETTELL'S ESTATE, LIMITED,
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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
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Is now used in many Gas-Works throughout Scotland with gratifying success.
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Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
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Gas, Steam, and other Fuel for Home and Export.
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COAL AND COKE STORAGE PLANTS.
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OUR DISCOUNT SYSTEM GAINS GROUND DAY BY DAY.
Greatly increases Sale of Gas.
Particulars and fullest description on application.
T. G. MARSH,
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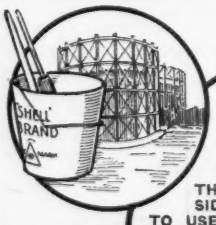

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POSSESS ALL THE PROPERTIES WHICH CHEAP PAINTS LACK.
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Important Improvements.

BURNERS.

1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

LAMPS.

From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

THE GLENBOIG UNION FIRE-CLAY CO., LTD.

GLENBOIG FIRE-BRICKS AND GAS-RETORTS.

Every Genuine Glenboig Brick, Block, Gas-Retort, &c., is legibly stamped with one or other of the Glenboig Company's Registered Trade Marks, as here shown.

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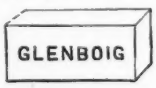
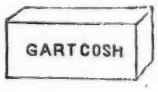
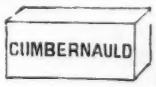


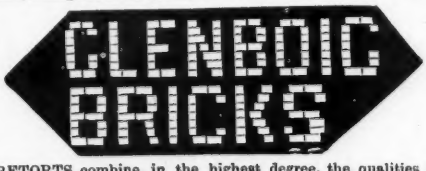




The Glenboig Trade Marks are imitated, and the Glenboig Name unfairly used by Makers of a lower Class of Goods, which, when sold under their own name, command much lower prices.
The Genuine Brand, Stamped on the Goods, is the only Reliable Guarantee to the Purchaser.

GAS-RETORTS, FIRE-BRICKS, BLOCKS, &c., &c.

The SPECIAL BRICKS used in the Construction of Gas Furnaces for Heating Retorts.



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Highest Award wherever exhibited.

The GLENBOIG BRICKS, BLOCKS, AND RETORTS combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and most sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, LEADENHALL STREET,
LONDON, E.C., September 21st, 1909.

DEAR SIRS,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 1000° C.	3·70%
" " " 1050° C.	4·76%
" " " Total	8·46%
Volume shrinkage at 1000° C.	10·7 %
" " " 1050° C.	12·6 %
" " Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. to 3362° F.

(SEGER CONE 36.) (New Scale CONE 38.

(Signed) J. T. NORMAN.

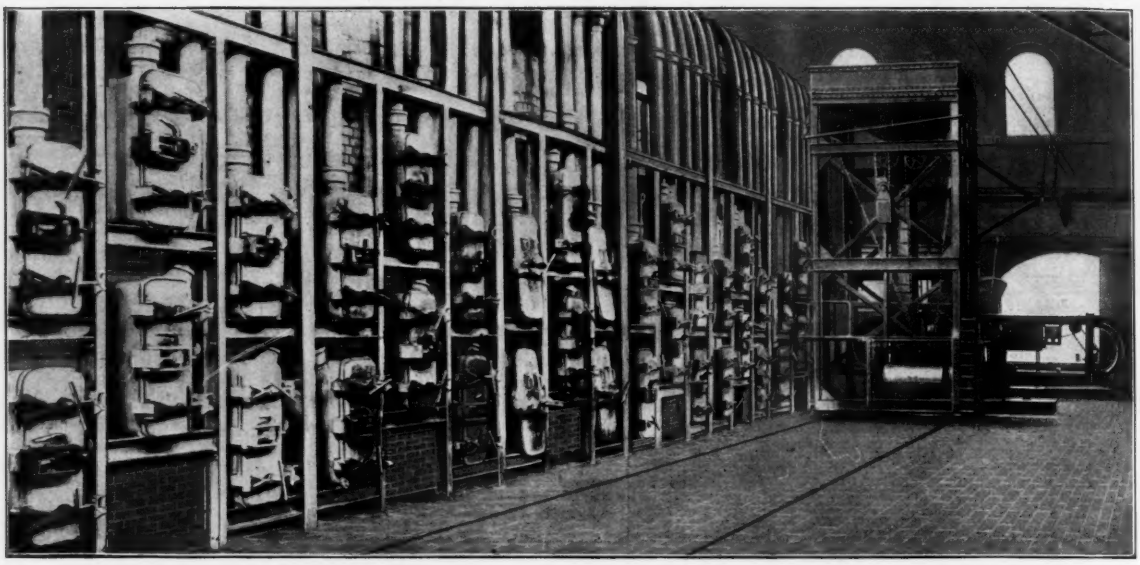
This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.

GLOVER'S PATENT

NORWICH CHAMBER

RETORT SETTINGS.



SPECIAL ADVANTAGES:—

21 CWT. CHARGES or larger it required.

GAS RESULTS, **13,600** cub. ft. of **14·5** c.p. gas per Ton of coal carbonized.

COKE, **GREY, DENSE,** and **MASSIVE,** suitable for many metallurgical purposes and for malting.

OPERATING COSTS considerably lowered owing to greatly reduced number of operations.

ADAPTABLE TO EXISTING REGENERATORS.

The work of **CHARGING AND DISCHARGING** these Chamber Retorts is performed by the **"D.B." STOKING MACHINES** with the same **SMOOTHNESS** and **RELIABILITY** that characterizes the working of the **"D.B. MACHINES"** with ordinary Retorts.

THE ONLY MACHINES THAT WILL COMPLETELY FILL CHAMBERS OR RETORTS.

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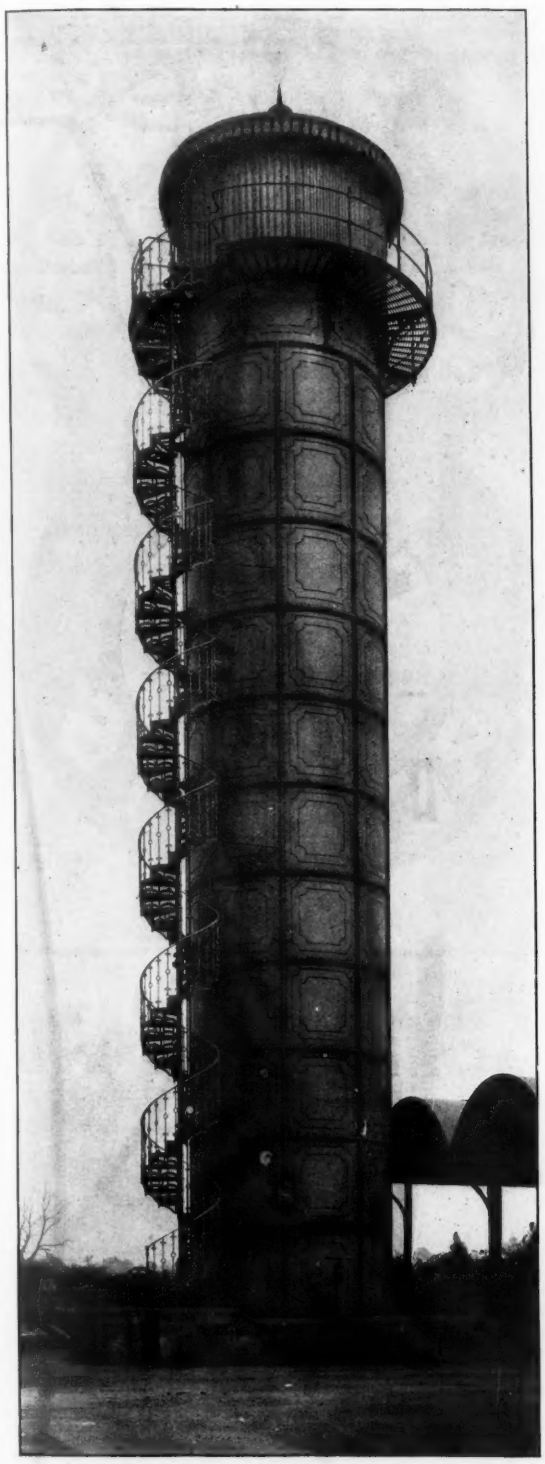

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LAPWELDED AND RIVETED STEEL PIPES.

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CARBURETTED WATER-GAS PLANTS.
Aggregate Capacity of Plants supplied
228,600,000 cubic feet Daily.

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WELDLESS STEEL SPIGOT AND FAUCET TUBES, FLANGED TUBES, SCREWED AND SOCKETTED TUBES, TUBULAR LAMP POSTS, &c., are **Unbreakable,** cost Nothing to Maintain, and are altogether more reliable and Durable than Iron.

They are FAR cheaper and more economical in the long run, and a source of great satisfaction to all users.

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Every Skein of equal weight and length.
The Lead Wool Joint is built up evenly all the way through.
Lead Wool requires no melting and can be used in water without risk.

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CONTRACTORS TO THE CHIEF GASWORKS IN THE BRITISH ISLES AND ABROAD.

FOR

MANUFACTURED FROM OUR CAREFULLY SELECTED AND WELL SEASONED STOCK OF OLD MINE FIRE CLAY.

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R. LAIDLAW & SON (EDINBURGH), LTD.

GAS METER MAKERS.

STATION METERS

IN

Ornamental Square & Round Cast-Iron Cases.

ALL SIZES.

Drawings, Specifications, and Prices on Application.

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EDINBURGH,
AND
6, LITTLE BUSH LANE,
LONDON, E.C.

LATEST DESIGN.

Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

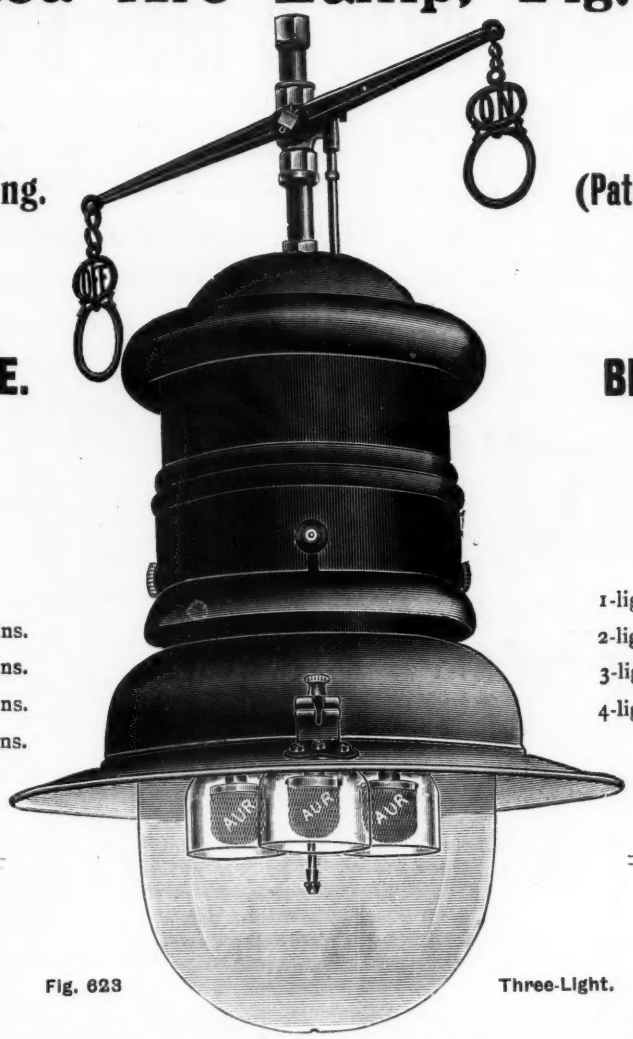

Fig. 623 Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.
3-light	12 feet	400	**52/6**	**6/-** extra.
4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

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Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

		1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra	each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra	"	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

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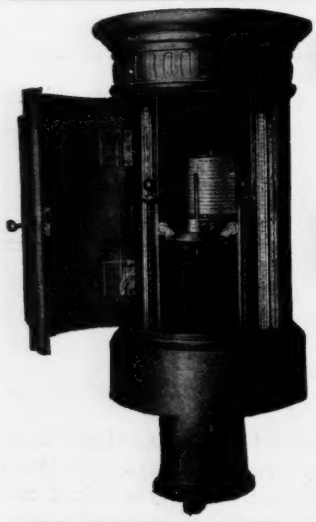

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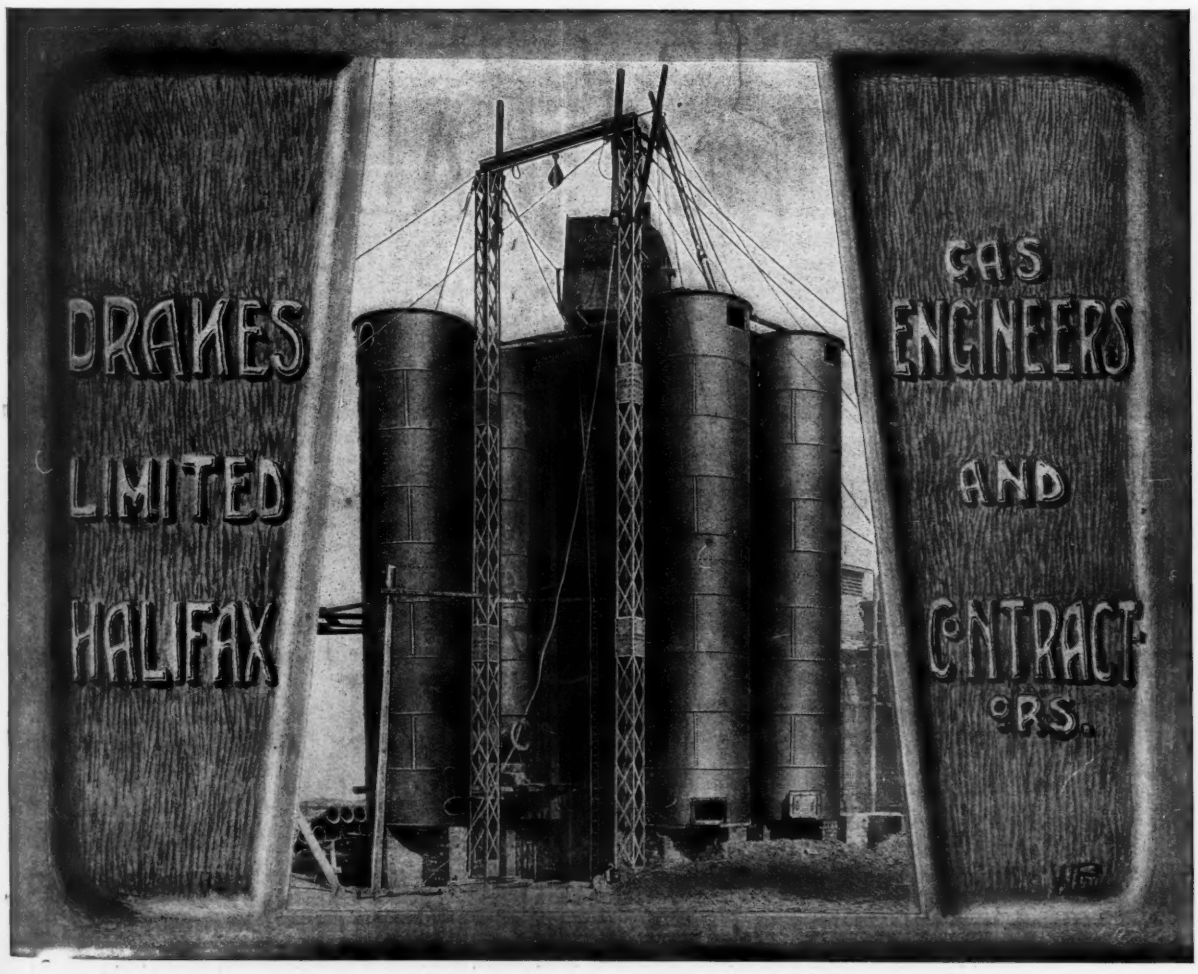

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Printed and Published by WALTER KING, at No. 11, BOLT COURT, FLEET STREET, in the CITY OF LONDON.—Tuesday, Feb. 22, 1910.